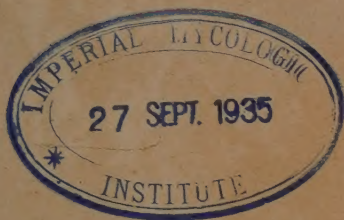




H.G. Burns

Ministry of Agriculture  
Cairo

HERB.



Bacteriological Dept.





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# FUNGUS-FLORA.



# BRITISH FUNGUS-FLORA.

A CLASSIFIED TEXT-BOOK OF MYCOLOGY.



BY

GEORGE MASSEE,

AUTHOR OF "PLANT LIFE," "THE PLANT WORLD," ETC.

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# FUNGUS-FLORA.

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## ASCOMYCETES.

THE very large number of species of fungi included in the group known as the Ascomycetes, are characterised by having their spores produced in *asci* or mother-cells. In the great majority of species the asci are numerous, closely packed side by side, and form the *disc* or *hymenium*, seated on and protected by a structure called the *ascophore*, which is either *parenchymatous*, that is, composed of a mass of more or less polygonal cells united to form a tissue, or consists of densely interwoven, septate hyphae. In the Discomycetes, the ascophore has usually been described in British mycological works as the *cup*, a vessel to which, in many species, it bears a resemblance; in other species, however, this term does not apply; whereas in the Hysteriaceae, the ascophore is never cup-shaped; therefore the term ascophore is invariably used in the present work, as being universally correct, in the sense of being the structure containing the asci.

In a few of the simplest genera, as *Ascomyces* and *Ascodesmis*, the asci either spring from the hyphae at intervals, or if clustered together are not enclosed in a protective covering. That portion of the ascophore situated immediately below the collection of asci forming the hymenium, is called the *hypothecium*, and the lateral portion of the ascophore up to the margin is the *excipulum*. In the Discomycetes, as already stated, the excipulum usually forms a more or less cup-shaped structure, whereas in the Hysteriaceae the excipulum is always laterally compressed, the *lips*, or the two compressed sides of the margin of the excipulum, being usually close

together, and leaving only a narrow *slit* or opening, through which the mature spores escape from the almost concealed disc. In some cases the base of the ascophore is narrowed below and prolonged as a stem-like structure, when it is said to be *stipitate*; when the stem is entirely absent, it is *sessile*. When a sessile ascophore is seated quite on the surface of the *substratum* or matrix, the substance on which it is growing, it is *superficial*; when more or less buried in the substratum, but with the upper surface exposed, it is *innate*; and when it originates entirely below the substratum or matrix, and bursts through during development, the ascophore is said to be *erumpent*. The texture of the ascophore varies considerably in different species; when rather thick, parenchymatous, and more or less brittle, it is described as *fleshy*; *cartilaginous*, when composed of interwoven hyphae, rather flexible and tough; in the *Hysteriaceae* the excipulum is usually *carbonaceous*, consisting of parenchymatous tissue, the external walls being rigid, blackish, and brittle, and breaking up into a carbonaceous mass when crushed. In *Bulgaria* and allied genera the ascophore is gelatinous when moist, becoming rigid and horny when dry.

The texture and consistence of the ascophore are points of primary importance in the discrimination of species, and should always be noted.

In numerous species the ascophore originates at once from delicate, colourless hyphae that are almost completely buried in the matrix; in others, some of the hyphae come to the surface, and form a more or less dense felt or *subiculum*, from which numerous ascophores usually spring; in a third type the hyphae form a dense parenchymatous cushion or *stroma*, from which the ascophores originate.

**Constituent parts of the ascophore.** In several species it has been demonstrated that the hyphae forming the excipulum and basal portion are developed first, and the paraphyses, which also belong to this portion, are formed before the asci, the last-named being developed from perfectly independent *ascogenous hyphae* that are not in organic continuity with the hyphae of the excipulum. During development the two systems of hyphae become much interwoven at the basal portion of the ascophore, and the growing

asci push up between the paraphyses. It is yet an open question as to whether this differentiation of hyphae is universal. Sexual reproduction is unknown in the Ascomycetes.

**Secondary forms of reproduction.** In addition to the formation of ascospores—spores formed in asci—other specialised reproductive bodies, collectively known as *conidia*, are present in some species, and usually precede the formation of ascospores.

These conidia-producing structures are very variable in form in different species, and in some instances more than one form is contained in the life-cycle of a species. Many such conidial forms belonging to the Ascomycetes were at one time considered as distinct species, and found a place in the Hyphomycetes or the Melanconieae; in fact it may be assumed, from analogy, that all the so-called species included in the two last-named groups are in reality only stages in the life-cycle of the higher fungi, and mostly belonging to the Ascomycetes.

**Asci.**—The asci, or mother-cells of the spores, as already explained, are the specialised tips of ascogenous hyphae, and when fully formed vary in form in different species, being *cylindrical*; *clavate* or club-shaped; or more or less broadly *obovate*. The apex may be *rounded* without any contraction; more or less *narrowed*; or *truncate*, that is, more or less flattened. In some species the basal portion of the ascus below the spore-bearing portion is considerably narrowed and elongated, when it is said to be *stipitate*.

When the spores are mature, they are ejected from the ascus, in some species with considerable force. At this stage the wall of the ascus and the protoplasm not used up in the formation of the spores absorb water and increase in size, especially near the apex, at which point the spores collect. When the wall of the ascus reaches the maximum of extension it ruptures at the point of least resistance—the apex—the elastic wall of the ascus contracting at the same moment from below upwards, the contained spores, along with the water, being ejected in a mass. The empty ascus, still fixed at the base, then collapses. The apical portion of the wall of

the ascus, most capable of expansion, is frequently much thicker than the lower portion, and in many species assumes a clear blue colour when treated with a solution of iodine, a plug occupying the apex becoming darkest in colour. This iodine reaction is frequently included in the specific diagnosis by Rehm, in his work on the Discomycetes in Rabenhorst's "Kryptogamen-Flora." In some species the apex of the ascus is ruptured in an irregular manner, in others there is a long slit, while in others again, as in many of the Ascoboleae, the apex opens by a distinct circular lid that remains upraised and attached by one side after the spores have escaped. Boudier, a French Mycologist, has proposed a classification of the Discomycetes, based on the mode of opening of the apex of the ascus; the arrangement, however, has not been adopted, as the character can only be distinctly observed in the fresh specimen.

In some species, clouds of spores are given off at maturity; this process is known as *puffing*, and is due to the simultaneous dehiscence of numerous asci. Shaking or breathing on the fungus causes this, which is considered by De Bary to be due to the sudden loss of water, the act being accelerated by whatever aids transpiration. No puffing is caused by shaking or otherwise if the fungus is shut up in a damp atmosphere. This, however, does not explain the matter entirely, as fungi will often puff after lying in a room for some hours, if moved. The phenomenon appears to depend on a difference of tension being brought about in the walls of the asci.

In *Ascobolus* and allied genera the asci expand so much that they project far above the surface of the hymenium at maturity; dehiscence takes place by the spores being ejected through a definite aperture formed by the opening of a circular lid at the apex, the ascus remaining fixed at the base, and not being ejected bodily, as is sometimes believed. After dehiscence the ascus shrivels and contracts.

**Spores.** The ascus when quite young is filled with finely granular, vacuolated protoplasm, in which a single nucleus is imbedded; as the ascus increases in size two nuclei are present, at a later stage four, and eventually eight nuclei can be seen; these eight nuclei are the starting-points for the formation of the eight spores, which are formed

simultaneously, and grow to about double their original size. Eight is the most usual number of spores present in an ascus, in a few cases four only are present, in others more than eight, and then a multiple of that number, as sixteen, thirty-two, sixty-four; when very numerous and minute, as in the species of *Tromera*, they are described as *indefinite*. The arrangement of spores is generally constant in a given species; *uniserial*, when the spores are arranged in a single row, and in such cases each spore when longer than broad, usually lies with its long axis more or less oblique to the long axis of the ascus: in such cases the spores are *obliquely uniserial*; *biserial* when the spores are in two rows, usually somewhat irregularly placed; *inordinate*, when the spores are grouped without order, often near the top of the ascus; *fasciculate*, when very long spores are arranged in a parallel bundle. All spores are without colour at first, and many remain so when quite mature, and are then described as *hyaline*, or colourless. In others, again, the epispore becomes coloured at maturity. The epispore is always smooth and even at first, but in many species becomes variously ornamented during growth; when covered with very minute projecting points it is said to be *verruculose*; and when the warts are larger and fewer in number, it is *warted* or *verrucose*. In many species the surface of the spore becomes ornamented with numerous more or less regular polygonal pits or depressions, thus leaving a network of raised ridges; such spores are said to be *reticulated*; when the reticulations are very minute, they are liable to be mistaken for minute warts, unless carefully examined, and many such spores have been erroneously described as verruculose or rugulose. In most species of *Ascobolus* the spores at maturity are of a beautiful purple or rich brown colour, and marked with very slightly raised lines, often running more or less parallel to the long axis of the spore, and frequently anastomosing.

In many spores the protoplasmic contents are coarsely granular, an appearance which has led to their being described as verruculose, even when the epispore is perfectly smooth; to guard against such mistakes, it is necessary to pay attention to the *outline* of the spore, and not to the *surface*. Spores vary in form from perfectly *globose* or *spherical*, to *filiform* or *needle-shaped*; in the latter case they are usually

almost as long as the ascus. Most of the terms used in describing spores are self-explanatory; they are said to be *cymbiform* when the outline resembles the long section of a boat; *sigmoid* when an elongated spore has the ends bent very slightly in opposite directions, like the letter S very much straightened out.

Spores are always *continuous* or 1-celled at first, and many remain persistently so; others become divided into two or more cells by the formation of septa at right-angles to the long axis of the spore; they are then described as *septate*, the numeral prefix indicating the number of septa present. In some works the number of cells is given instead of the number of septa; there is of course always one more cell than septum present, hence a 1-septate spore would be a 2-celled spore; spores are said to be *muriform* when septa are formed at right angles to each other, thus forming a parenchymatous, many-celled spore. Some spores are furnished at maturity with a delicate, hyaline filament at one or both ends, such appendages are considered to serve the purpose of keeping the spores in their relative position in the ascus.

The apex of the spore is the end nearest the apex of the ascus, the base consequently pointing to the base of the ascus; this point can of course only be determined by seeing the spores in the ascus, and is of importance, as when the two ends of the spore are dissimilar in form, or when the septa are arranged in a different manner at the two ends of the spore. When spores are ejected from the ascus, it is assumed that they are quite mature, hence for purposes of measurement and description it is advisable to draw up a diagnosis from *free* or discharged spores whenever practicable. The use of dilute potassic hydrate and solution of iodine, will aid greatly in forming a correct idea as to the detailed structure of spores. In many spores one or more oleaginous globules or guttulae are present; their presence is indicated by the term *guttulate*. These highly refractive globules are frequently called nuclei in old works, a structure with which they possess nothing in common.

**Paraphyses.** In the majority of species, the asci are accompanied by accessory organs called paraphyses; these structures, which are usually slender—always sterile—hairs,



are terminal branches of hyphae forming the tissue of the ascophore, and quite distinct in origin from the asci, which are developed at a later stage than the paraphyses, and grow up between the latter. Paraphyses are of value in a specific diagnosis, and the following points should always be noted : presence or absence of septa ; form, as cylindrical, *clavate*, or *lanceolate* ; simple or branched ; presence or absence of colour at the *apex* or tip, which may be straight, curved, or variously curled or contorted ; in some species the paraphyses are *agglutinated* or held together by colourless or coloured mucilage ; finally, the paraphyses may be of equal length to the asci—the most usual condition—or longer.

When the paraphyses are slender, the transverse septa are difficult to see when examined in water ; when any doubt as to their presence is entertained, in fact always when septa cannot be seen at first, the preparation should be treated with dilute potassic hydrate, which can be accomplished by allowing a drop of the solution to be drawn under the cover-glass, when if septa are present, they will show up clear and sharp. In other cases paraphyses are so very delicate that their presence is doubtful ; in such cases a drop of iodine solution will be of service.

**Colour.** Fatty matters are very general in fungi, and are often highly coloured ; but it is not yet determined whether the fat is itself coloured, or only serves as a vehicle for the colouring matter. According to De Bary, such is the origin of the colours passing from yellow to brick-red in so many fungi, as *Peziza aurantia*, &c. The brilliant tints so common in the disc or hymenium of so many of the Discomycetes is entirely due to the presence of colouring matter in the tips of the paraphyses.

The green colour present in some fungi, as *Chlorosplenium aeruginosum*, is not due to the presence of chlorophyll.

**Habitat.** In collecting specimens, it is of great importance to note the habitat, which, within due limits, may be considered as part of the specific character ; a species, for instance, that habitually grows on the ground is not likely to occur on naked wood ; neither is a species that is known to grow on wood likely to occur on herbaceous stems ; in

this sense a knowledge of the habitat is one factor of value in discriminating between morphologically closely allied species.

**Examination.** A few hints on the use of different reagents for emphasizing doubtful points have already been given; and remembering the numerous imperfect statements to be found in many books, respecting matters of microscopic detail, as the form and septation of paraphyses, septation of spores, and nature of ornamentation of the epispore, it may be repeated that the substitution of very dilute potassic hydrate for water will frequently reveal, clearly defined, septa that could not be seen, or at most vaguely, when examined in water. In the case of working with material that has been dried, the use of potassic hydrate is a necessity, the parts of the section, as hairs, paraphyses, spores, &c., expanding much better than when water alone is used, especially if the slide is heated over a spirit-lamp until the liquid just boils, the cover-glass being kept in position by a spring-clip. On the other hand it is equally important not to abuse the use of potassic hydrate by using too strong a solution, or by prolonged boiling in this medium, otherwise the cell-walls become swollen, and an appearance is produced quite foreign to the specimen under normal conditions. It is possible to treat coarsely warted spores with potassic hydrate until the wall becomes so much swollen as to appear quite smooth, or in fact until it disappears altogether. When a section is very delicate and too transparent to show the details, a drop of dilute solution of iodine will make it stand out sharp and clear.

When it is desired to make a thorough study of the morphology of a species, it should first be placed in alcohol, and allowed to remain for some days at least. By adopting this method the specimen is rendered firm, and the whole structure at the same time made quite clear. When collecting, it is always advisable to carry a bottle containing methylated spirit, into which specimens intended for critical examination can be placed. These can afterwards be placed in absolute alcohol, or will work quite well if only kept in methylated spirit, and in this medium they can be kept for any length of time—the longer the better—before being



used. A note of the colour should be made when fresh, as this disappears in most species when placed in spirit.

Finally, make careful sketches—always drawn to the same scale—accompanied by notes, when examining a species, then the work will not have to be done over again; always bearing in mind that notes and sketches made by yourself are more valuable than those made by any one else; besides, no one can be considered to know a species thoroughly until it has been worked out by himself.

**Type specimens.** In the case of the Basidiomycetes, excepting the Polyporeae, type specimens are of very little value, the information to be derived from a dried agaric or *Clavaria* being usually reduced to the form, size, and colour of the spore; characters certainly not of primary value in a *specific* diagnosis in this group.

In the Hysteriaceae and the Discomycetes the case is very different; in the former a dried specimen, when properly soaked and examined, is quite as good as a fresh one, and even in the fleshy Discomycetes the same statement holds good, with the one exception of colour, which to some extent changes during drying; hence all available types have been examined. It will probably be noted that the characters of many familiar species, as given in this book, differ more or less in matters of detail from those to be found in previous works; this apparent discrepancy is explained by the fact that many of the types were described half a century ago, when microscopic details received very little attention; and even in the case of more recently described species, microscopic features, other than the spores, are often scanty.

In those cases where no type specimen was accessible, the form considered as typical by common consent, and contained in some well-known exsiccati, is accepted, and such source is quoted.

## Ord. ASCOMYCETES.

## Fam. Gymnoascaceae.

Ascophore absent, hence the asci are naked.

## Fam. Hysteriaceae.

Ascophore elongated, black, minute, dehiscing by an elongated narrow slit.

## Fam. Discomycetes.

Ascophore more or less fleshy, often large, usually bright coloured; disc or hymenium fully exposed at maturity.

## Fam. Pyrenomycetes.

Ascophore small, globose or flask-shaped, dehiscing by a minute apical, rounded pore, or rarely by a slightly elongated slit, or indehiscent; either solitary, or gregarious on a variously formed stroma.

## Fam. Tuberaceae.

Subterranean; ascophore irregularly globose, usually large, indehiscent.

## Fam. GYMNOASCACEAE. Baran.

Ascophore spurious, excipulum entirely absent; often effused and forming spots or patches; sometimes byssoid; rarely forming wart-like prominences; asci more or less exposed, 1-4-8-many-spored, paraphyses very rare.

*Gymnoascaceae*, Baranetzky, Bot. Ztg., 1872, p. 158; emended by Saccardo, Syll. viii., p. 811.

The leading characteristic of the present family consists in the entire absence of the excipulum, the asci being naked throughout their length, and from the first. Some of the species are true parasites, causing peculiar malformations and distortions on living branches, leaves, fruit, &c., and known popularly as "birds' nests," "witches' brooms," "plum-pockets," &c. Others occur as saprophytes, under the form of minute cottony tufts, on the dung of various animals.

Taken altogether the members of the present family illustrate the Ascomycetes in their most reduced condition, nothing remaining but the ascus-bearing hyphae, no trace of perithecium or protective covering of any kind being present. An approach to this condition of things occurs in the *Stictae*.

#### Subfam. I. ASCOMYCEAE. Mass.

Asci parallel, densely crowded, sessile or furnished with a basal or stem-cell. Parasitic on living plants.

#### Subfam. II. GYMNOASCEAE. Baran.

Asci scattered or clustered, not parallel; more or less surrounded by a web of hyphae. Saprophytes.

### ANALYSIS OF THE GENERA.

#### ASCOMYCEAE.

**Ascomyces.** Parasitic on living plants.

#### GYMNOASCEAE.

**Gymnoascus.** Asci scattered, 8-spored.

**Ascodesmis.** Asci parallel, crowded, 8-spored, paraphyses present, also trace of ascophore. (Forms a transition to the *Ascoboleae*.)



## FIGURES ILLUSTRATING THE GYMNOASCACEAE, &amp;c.

Fig. 1, *Keithia tetraspora*, Sacc., fungus seen from above, after dehiscence; slightly  $\times$ ;—Fig. 2, ascus and paraphysis of same, highly  $\times$ ;—Fig. 3, free spores of same;  $\times 300$ ;—Fig. 4, two plants of same on leaf of juniper; nat. size;—Fig. 5, *Ascomyces aurea*, Fries, showing a blister formed by the fungus on leaf of black poplar; nat. size;—Fig. 6, section through one of the blisters, showing the asci of the *Ascomyces*, each with its basal cell, passing between the epidermal cells, *a*, of the host; highly  $\times$ ;—Fig. 7, free spores of same; one is producing elliptical secondary spores by gemmation;  $\times 300$ ;—Fig. 8, *Ascomyces deformans*, Fekl., section through portion of a blister on a peach leaf, formed by the fungus, showing the asci originating from a hypha running between the epidermis and the cuticle; a portion of the vegetative hyphæ of the fungus is seen running between the cells of the host; highly  $\times$ ;—Fig. 9, free spores of same;  $\times 300$ ;—Fig. 10, *Coccomyces striatus*, Phil. and Plow., fungus seen from above, after dehiscence; slightly  $\times$ ;—Fig. 11, the same on a fragment of dead bramble stem: nat. size;—Fig. 12, ascus and paraphyses of same; highly  $\times$ ;—Fig. 13, free spores of same;  $\times 300$ ;—Fig. 14, *Celidium varians*, Arnold, several specimens growing as a parasite on the thallus of the lichen *Lecanora glaucoma*; nat. size;—Fig. 15, section through ascophore of same; slightly  $\times$ ;—Fig. 16, ascus and paraphyses of same; highly  $\times$ ;—Fig. 17, free spores of same;  $\times 300$ ;—Fig. 18, *Abrothallus parmeliarum*, Arn., ascophore viewed from above, parasitic on the thallus of the lichen *Parmelia saxatilis*; slightly  $\times$ ;—Fig. 19, ascus and very much branched paraphyses of same; highly  $\times$ ;—Fig. 20, free spores of same;  $\times 300$ ;—Fig. 21, *Phacidium infestans*, Karsten, free spores;  $\times 300$ ;—Fig. 22, *Stictis radiata*, Pers., several specimens; nat. size;—Fig. 23, one specimen of same; rather highly  $\times$ ;—Fig. 24, ascus and paraphyses of same; highly  $\times$ ;—Fig. 25, spore of same;  $\times 300$ ;—Fig. 26, spore of same;  $\times 750$ ;—Fig. 27, *Nemacyclus niveus*, Sacc., specimens on leaves of the Scotch fir; nat. size;—Fig. 28, on specimen of same: slightly  $\times$ ;—Fig. 29, ascus and paraphyses of same; highly  $\times$ ;—Fig. 30, free spores of same;  $\times 300$ ;—Fig. 31, *Melittosporium pteridinum*, Sacc., ascus and paraphyses; highly  $\times$ ;—Fig. 32, spore of same;  $\times 300$ ;—Fig. 33, *Melittosporium lichenicolum*, Mass., ascus and paraphyses;  $\times 300$ ;—Fig. 34, *Agyrium rufum*, Fries, plants; slightly  $\times$ ;—Fig. 35, ascus and paraphyses of same;  $\times 300$ ;—Fig. 36, *Laquearia sphaeralis*, Fr., plants; nat. size;—Fig. 37, section of an ascophore; slightly  $\times$ ;—Fig. 38, ascus and paraphyses of same;  $\times 300$ ;—Fig. 39, *Trochila craterium*, Fr., portion of an ivy leaf with specimens: nat. size;—Fig. 40, ascus and paraphyses;  $\times 300$ ;—Fig. 41, a single plant of same after dehiscence; slightly  $\times$ ;—Fig. 42, *Trochila ilicis*, Crouan, portion of holly leaf with specimens; nat. size;—Fig. 43, ascus and paraphysis;  $\times 300$ ;—Fig. 44, section through ascophore of same; slightly  $\times$ ;—Fig. 45, *Gymnoascus Reesii*, Baran., portion of a fertile hypha bearing asci;  $\times 300$ ;—Fig. 46, *Ascodesmis nigricans*, Van Tieghem, portion of a tuft of asci and paraphyses;  $\times 300$ ;—Fig. 47, *Heterosphaeria patella*, Grev., plants on a dead stem of umbellifer; nat. size;—Fig. 48, section of ascophore before

## Subfam. I. ASCOMYCEAE.

ASCOMYCES. Mont. & Desm. (figs. 5–9, p. 12.)

Parasitic on living plants; causing the affected parts to become discoloured and variously blistered or contorted; ascigerous hyphae ramifying in the tissues of the host, and giving origin to the asci, which burst through the cuticle and form a continuous bloom on the surface; asci either springing directly from the hyphae without a transverse septum, or furnished with a transverse septum at some distance from the base, the portion below the septum being called the stem-cell; asci primarily 8-spored, but in most species the spores produce conidia while yet in the ascus, which then appears as if containing many spores.

*Ascomyces*, Montagne & Desmaz., Ann. Sci. Nat., Ser. iii., vol. x., p. 344; Phil., Brit. Disc., p. 399.

*Taphrina*,  
*Exoascus*, } of authors.

A.—*Mycelium* perennial, spreading through the intercellular spaces of the tissue of the young shoots of infected plants in the spring.

\* *Ascus* with a transverse septum near the base, cutting off a stem-cell.

***Ascomyces pruni*.** B. & Br., Ann. Nat. Hist., n. 1629; ser. iv., vol. xvii., p. 145; Phil., Brit. Disc., p. 400.

Asci oblong-clavate, apex somewhat truncate, or sometimes

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dehiscence; slightly  $\times$ ;—Fig. 49, ascus and paraphyses of same; highly  $\times$ ;—Fig. 50, free spores of same;  $\times$  300;—Fig. 51, stylospores of same;  $\times$  300;—Fig. 52, *Durella connivens*, Rehm., group of plants; nat. size;—Fig. 53, a single plant of same in an expanded condition; slightly  $\times$ ;—Fig. 54, ascus and paraphysis of same; highly  $\times$ ;—Fig. 55, free spore of same;  $\times$  300;—Fig. 56, *Biutorella resinæ*, Mudd, plants; nat. size;—Fig. 57, ascus and paraphyses of same;  $\times$  300;—Fig. 58, free spores of same;  $\times$  500;—Fig. 59, *Colpoma quercinum*, Wallr., group of fungi on oak branch; nat. size;—Fig. 60, sections of same; slightly  $\times$ ;—Fig. 61, asci and paraphyses of same; highly  $\times$ ;—Fig. 62, portions of two spores of same in different stages of development;  $\times$  750.

rounded,  $40-50 \times 10-13 \mu$ , stem-cell  $14-18 \times 8 \mu$ ; spores hyaline, continuous, smooth,  $5.5-6.5 \times 4-4.5 \mu$ .

*Exoascus pruni*, Fekl., Enumer. Pl. Nassov., p. 29; Winter, Krypt.-Flora, Gymnoasceae, p. 5, fig. 3, p. 4; Sacc. Syll., viii., n. 3342; Frank, Krankh. der Pflanzen, p. 524, fig. 89.

Causing peculiar deformations on the young fruit of the plum, sloe, and bird-cherry.

Type specimen examined.

**Ascomyces bullatus.** Berk., Intr. Crypt. Bot., p. 284, fig. 66, c; Phil., Brit. Disc., p. 401.

Tufts at first small and isolated, soon running into each other; covered at first by the epidermis which is raised in blisters; asci narrowly clavate,  $35-40 \times 8-9 \mu$ , stem-cell nearly cubical, about  $8 \mu$  across; spores variable, globose, ovate or broadly elliptical, hyaline, continuous, smooth,  $4-5 \mu$  diameter.

*Oidium bullatus*, B. & Br., Journ. Hort. Soc., ix., p. 51, with a fig.

*Exoascus bullatus*, Fekl., Symb. Suppl. ii., p. 49; Sacc., Syll., n. 3343; Winter, Krypt.-Flora, Gymno., p. 5.

Forming blisters on living leaves of pear and hawthorn; spring.

Type specimen examined.

**Ascomyces deformans.** Berk., Intr. Crypt. Bot., p. 284; Berk., Outl., p. 376, t. 1, fig. 9, A, B; Phil., Brit. Disc., p. 401. (figs. 8, 9, p. 12.)

Developing on the under surface of the leaf, and forming scattered swollen places which become powdered with white meal; asci subcylindrical,  $40-50 \times 7-8 \mu$ , stem-cell  $12-16 \mu$  long, up to  $5 \mu$  thick at the apex, and narrowing downwards; spores continuous, hyaline, elliptical, smooth,  $7 \times 3-4 \mu$ .

*Exoascus deformans*, Fuckel, Symb., p. 252; Winter, Krypt.-Flora, Gymno., p. 6; Sacc., Syll., viii. n. 3341; Sadeb., Exoasc., p. 114, fig. 19.

Type specimen examined.

Causing the disease known as "curl" in leaves of peach and apricot; also forming the dense fasciculation of small branches called "bird's nests" or "witches' besoms," in the plum, cherry, and bird-cherry.



**\*\* *Asci not septate near the base.***

**Ascomyces potentillae.** Phil., Brit. Disc., p. 402.

Forming pale, yellowish-green spots on the stem and leaves, these eventually change through brown to purple; asci clavate, apex rounded,  $40-50 \times 7-8 \mu$  tapering downwards into a delicate pedicel often less than  $2 \mu$  thick, which passes between the epidermal cells; spores hyaline, colourless, continuous, subglobose or elliptic-oblong,  $4-5 \mu$  diam., or  $4-8 \times 2-4 \mu$ .

*Exoascus deformans*, var. *Potentillae*, Farlow, Proc. Amer. Acad. of Arts & Sci., vol. xviii. p. 84 (1884).

*Exoascus potentillae*, Sacc., Syll., viii., n. 3352.

*Taphrina potentillae*, Johanson, Vet. Ac. Handl., 1885, p. 29, t. 1, f. 2; Robinson, Annals Bot., vol. i. p. 171.

On living leaves and stems of *Potentilla tormentilla*. This fungus also occurs on several other species of *Potentilla* on the Continent and in the United States.

The asci in the Scottish specimen are truncate or rounded at the summit, and attenuated downwards more or less equally to a stem-like base, arising directly from the branching hyphae beneath the cuticle,  $30-50 \mu$  high,  $7-9 \mu$  in the broadest part, and  $2 \mu$  in the narrowest part. The sporidia are confined to the broad upper half of the ascus, elliptic, and (as I measure them)  $4-5 \times 2-2.5 \mu$ . (Phillips.)

B.—*Hyphae spreading only between the cuticle and the epidermis.*

**\*\* *Asci furnished with a stem-cell.***

**Ascomyces alnitorquus.** Mass.

Asci irregularly cylindrical, apex truncate,  $35-40 \times 7 \mu$ , stem-cell  $12-20 \mu$  long, as wide or even slightly wider than the asci, base narrowed and seated between the uppermost portion of the epidermal cells; spores subglobose,  $3-3.5 \mu$  diameter.

*Taphrina alnitorquus*, Tul., Ann. Sci. Nat., ser. v. vol. v. p. 130.

*Exoascus alni*, De Bary, in Fuckel's Symb. Myc., p. 252 (in part).



*Exoascus alnitorquus*, Winter, Krypt.-Flora, Gymn., p. 7; figs. 1-4, p. 4; Sacc., Syll., viii., n. 3345.

*Ascomyces Tosquinetii*, Westend., Bull. Acad. Roy. Belg., ser. ii., vol. xi., p. 655 (in part); Phil., Brit. Disc., p. 403.

*Ascomyces alni*, B. & Br., Ann. Nat. Hist., n. 1628, ser. iv., vol. xvii. p. 144 (1876); Phil., Brit. Disc., p. 403.

Producing blisters on the upper surface of the leaves of *Alnus glutinosa*; also deforming the bracts of the female inflorescence of *Alnus glutinosa* and *Alnus incana*.

Berkeley's types examined, also specimens from Kunze, Fung. Sel. exs., n. 369, and Thümen, Myc. Univ., 1366.

**Ascomyces aureus.** Magnus, Hedw., 1875, p. 2. (figs. 5-7, p. 12.)

Forming convex blisters  $\frac{1}{2}$ -1 cm. across, of a bright golden yellow, minutely pruinose on the concave side of the blisters, which is usually the underside of the leaf, due to the numerous asci that emerge from between the epidermal cells of the host; asci clavate,  $85-95 \times 14-16 \mu$ , apex truncate, base attenuated and immersed in the host for a distance of  $30-50 \mu$ ; seated on an obconic basal cell  $15-22 \mu$  long; spores at first 8, globose, colourless, about  $4 \mu$  diameter; these by gemination give origin to numerous elliptical sporidiola that completely fill the ascus.

*Taphrina aurea*, Fries, Obs. i., p. 217; Sacc., Syll., n. 3325.

*Exoascus aureus*, Sadebeck, Pilz. Exoas., p. 118, t. 4, f. 23.

*Exoascus populi*, Thümen, Hedw., p. 98 (1874).

On living leaves of *Populus nigra*.

The large golden-yellow blisters on the leaves superficially resemble galls due to insect agency.

In Sadebeck's monograph of this group, "Untersuchungen über die Pilzgattung *Exoascus*," the asci of the present species are described as being destitute of a basal cell, and the accompanying figure shows the asci springing directly from a septate hyphae running between the cuticle and the epidermis. A basal cell is however certainly present, and is described and figured by Frank in his admirable "Krankheiten der Pflanzen," p. 523, fig. 88.

**Ascomyces turgidus.** Phil., Brit. Disc., p. 404.

Asci formed during spring and summer on the under surface of the leaves; the attacked leaves curl and pucker, lose their

green healthy appearance, and are covered on the under surface with a greyish-white hoariness, due to the presence of the numerous asci, which are somewhat clavate,  $46-50 \times 15 \mu$ , stem-cell  $16-17 \mu$  long,  $15 \mu$  broad, tapering downwards and penetrating between the epidermal cells; spores  $3-4 \mu$  diameter.

*Exoascus turgidus*, Sadebeck, Krypt.-Flora, Gymno., p. 8; Sacc., Syll., viii., n. 3347.

*Taphrina betulina*, Rostr., Bot. Centralbl., xv., p. 149.

On *Betula alba*. Spring and summer.

The "birds' nests" or "witches' besoms," so common on the birch, are caused by this fungus.

### *Excluded species.*

*Ascomyces juglandis*, Berk., Outl., p. 376; Phil., Brit. Disc., p. 404.

*Ascomyces trientalis*, Berk., in Cooke's Hdbk., n. 2234; Phil., Brit. Disc., p. 405.

The very brief descriptions appended to the above species are absolutely valueless, and no type specimens exist, hence the names must drop, because even if a species of *Ascomyces* did actually occur on leaves of walnut or *Trientalis*, there would not be the slightest proof that it was the species intended by Berkeley.

## Subfam. II. GYMNOASCEAE.

### GYMNOASCUS. Baran. (fig. 45, p. 12.)

Ascophore spurious, consisting of a minute dense web of septate, branched, and anastomosing hyphae, bearing laterally numerous obovate, 8-spored asci; spores continuous, smooth, hyaline or tinged brown, elliptical; paraphyses absent.

*Gymnoascus*, Baranetzky, Bot. Ztg., 1872, p. 145; Sacc., Syll., viii., p. 823.

Resembling under a low power of the microscope, one of the densely compacted Hyphomycetes. Baranetzky's paper,

quoted above, gives an exhaustive account of the life-history of *G. Reesii*,

**Gymnoascus Reesii.** Baran., Bot. Ztg., 1872, p. 145, pl. iii. a; Sacc., Syll., viii. n. 3367. (fig. 45, p. 12.)

Growing in pulvinate tufts up to 1 mm. across, at first white, then straw-colour, finally orange-yellow; hyphae abundantly branched, often anastomosing, interwoven, septate, yellowish; asci borne in clusters on the hyphae, obovate or piriform, shortly stipitate, 8-spored, 8–10  $\mu$  diameter; spores broadly elliptical or almost globose, smooth, continuous, 4–5  $\times$  3–3.5  $\mu$ ; pale brown at maturity.

On dung of horse, sheep, &c.

**Gymnoascus ruber.** Van Tiegh., Bull. Soc. Bot. France, 1877, p. 159; Sacc., Syll., viii. n. 3368.

Forming pulvinate tufts about 1 mm. across, sometimes becoming confluent, rather compact, blackish-red; hyphae irregularly branched, interwoven; asci subglobose, 8-spored, 10–12  $\mu$  diameter; spores subglobose, 4.5–5.5  $\mu$ .

Growing on dung of dog, mouse, &c.

### ASCODESMIS. Van Tiegh. (fig. 46, p. 12.)

Ascophore almost obsolete; asci 8-spored, accompanied by paraphyses, springing here and there in dense clusters and forming a disc-like surface, from the effused mycelium; spores elliptical or globose.

*Ascodesmis*, Van Tieghem, Bull. Soc. Bot. France, 1876, p. 271; Sacc., Syll., viii. p. 824.

Distinguished among the Gymnoascaceae by the presence of paraphyses, and also by the asci being closely packed in radiating fascicles somewhat as in the lowest types of the *Ascoboleae*, to which group the present genus forms a transition.

**Ascodesmis nigricans.** Van Tieghem, Bull. Soc. Bot. France, 1876, p. 271; Zukal, Denkschr. der Mathematisch-Naturwis. Classe der Kaiserl. Akad. der Wissensch., Bande li., 1885, p. 7, taf. 2; Sacc., Syll., viii. n. 3374. (fig. 46, p. 12.)

Forming very minute point-like spots up to  $\frac{1}{3}$  mm. across, surrounded by radiating mycelium, globose-discoid; fertile hyphae branched, septate, interwoven; asci fasciculate, clavate, apex truncate, 8-spored; spores irregularly biseriata, elliptical, exospore delicately reticulated, brown; paraphyses filiform, scanty.

On dung of horse and sheep.

There is a very delicate spreading mycelium, from which thicker ascus-bearing branches are given off here and there; the asci are more or less parallel and form a hymenium, and mixed with a few very slender paraphyses; there is no trace of excipulum, and the hypothecium consists of loosely interwoven hyphae. The coloured spores with a reticulated epispore, suggests affinity with the *Ascoboleae*.

### HYSTERIACEAE.

Ascophore erumpent, innate, or superficial; horizontally elliptical or linear, or vertical and laterally compressed; texture carbonaceous or membranaceous; dehiscing by a narrow slit running the entire length of the ascophore, black or blackish-brown; asci 4-8-spored; spores hyaline or coloured, continuous or septate; paraphyses usually present.

The constant features of the present group are the black, elongated ascophore dehiscing by a longitudinal, narrow slit; hence the disc is almost persistently concealed. In some genera the ascophore is narrowly elliptical and slightly convex, in others it branches in a stellate manner; in others again the ascophore rises vertically and is at the same time laterally compressed, resembling in miniature a mussel or oyster shell, standing on its hinge, and with the slightly gaping opening uppermost. When the ascophore is vertical or superficial, it is rigid and carbonaceous; when developed beneath the epidermis, as in *Hypoderma*, it is membranaceous. Secondary or conidial forms of reproduction are known in but few species.

Hysteriaceae are allied on the one hand to the Discomycetes, and on the other hand to the Pyrenomycetes. The genera *Colpoma* and *Triblydiella* among the Discomycetes differ mainly in the long slit running the entire length of

the ascophore gaping widely at maturity, and thus exposing the whole of the elongated, narrow disc.

The species are all minute, and mostly gregarious; all are saprophytes, growing on old wood, bark, and also on dry leaves.

### ANALYSIS OF THE GENERA.

#### A.—*Spores coloured.*

- ✓ **Farlowia.** Spores continuous.
- Mytilidion.** Spores 3-7-septate; ascophore vertical, mussel-shaped.
- ✓ **Hysterium.** Spores 3-7-septate; ascophore not mussel-shaped.
- Ostreion.** Spores muriform; ascophore vertical, oyster-shaped.
- ✓ **Hysterographium.** Spores muriform; ascophore not oyster-shaped.

#### B.—*Spores hyaline.*

- Actidium.** Spores 1-septate; ascophore stellately branched.
- Aulographum.** Spores 1-septate; ascophore not stellate, membranaceous.
- ✕ **Glonium.** Spores 1-septate; ascophore not stellate, carbonaceous.
- Hypoderma.** Spores elongated, narrowly cylindrical or fusiform; ascophore membranaceous.
- Lophium.** Spores needle-shaped, nearly as long as the ascus; ascophore vertical, mussel-shaped.
- Lophodermium.** Spores needle-shaped, nearly as long as the ascus; ascophore not mussel-shaped.
- ✓ **Gloniopsis.** Spores muriform.
- ✓ **Dichaena.** Asci sessile, broadest at the base; ascophores densely gregarious.





## FIGURES ILLUSTRATING THE HYSTERIACEAE, &amp;c.

Fig. 1, *Lophium mytilinum*, Fries, a group of plants; nat. size;—Fig. 2, one ascophore; slightly  $\times$ ;—Fig. 3, ascus and paraphysis; highly  $\times$ ;—Fig. 4, spores of same;  $\times 300$ ;—Fig. 5, *Farlowia repunda*, Sacc., group of plants; nat. size;—Fig. 6, one plant of same; slightly  $\times$ ;—Fig. 7, section of same; slightly  $\times$ ;—Fig. 8, ascus and paraphyses of same; highly  $\times$ ;—Fig. 9, spores of same;  $\times 300$ ;—Fig. 10, *Dichaena quercina*, Fries; nat. size;—Fig. 11, ascus and paraphyses of same; the spores should not be muriform as represented, but 3 septate; highly  $\times$ ;—Fig. 11a, spores of same;  $\times 300$ ;—Fig. 12, spores of *Dichaena faginea*, Fr., var. *capreae*;  $\times 300$ ;—Fig. 13, *Hysterium pulicare*, Pers.; nat. size;—Fig. 14, one plant of same, seen from above; slightly  $\times$ ;—Fig. 15, ascus and paraphysis of same; highly  $\times$ ;—Fig. 16, spores of same;  $\times 300$ ;—Fig. 17, *Actidium hysteroioides*, two plants; slightly  $\times$ ;—Fig. 18, free spores of same;  $\times 300$ ;—Fig. 19, ascus of same; highly  $\times$ ;—Fig. 20, group of plants of same; nat. size;—Fig. 21, *Schizothyrium ptarmicae*, plants on a living leaf of *Achillea ptarmica*; nat. size;—Fig. 22, plants of same on portion of a leaf; slightly  $\times$ ;—Fig. 23, ascus and paraphyses of same;  $\times 300$ ;—Fig. 24, *Schizoxylon Berkeleyanum*, portion of a spore, breaking up into cells at the septa;  $\times 750$ ;—Fig. 25, ascus and paraphyses of same;  $\times 300$ ;—Fig. 26, one plant of same; slightly  $\times$ ;—Fig. 27, plants of same on dead stem; nat. size;—Fig. 28, *Ephelina radicalis*, Mass., showing the blackened swelling on the stem of *Rhinanthus*, caused by the fungus; nat. size;—Fig. 29, ascus and paraphyses of same;  $\times 300$ ;—Fig. 30, stylospores of same;  $\times 300$ ;—Fig. 31, *Ostreion americanum*, Duby, spore;  $\times 300$ ;—Fig. 32, *Hystero-graphium iraxini*, group of plants; nat. size;—Fig. 33, spore of same;  $\times 300$ ;—Fig. 34, *Ocellaria aurea*, Tul., group of plants bursting through the bark of a branch; slightly  $\times$ ;—Fig. 35, ascus and paraphyses of same;  $\times 300$ ;—Fig. 36, *Gloniopsis curvata*, Sacc., nat. size;—Fig. 37, ascus and paraphyses of same; highly  $\times$ ;—Fig. 38, free spore of same;  $\times 300$ ;—Fig. 39, *Mytilidion laeviusculum*, Sacc., group; nat. size;—Fig. 40, one ascophore; slightly  $\times$ ;—Fig. 41, free spores of same;  $\times 300$ ;—Fig. 42, *Xylographa parallela*, Fries, three plants seen from above; slightly  $\times$ ;—Fig. 43, sections of same; slightly  $\times$ ;—Fig. 44, ascus and paraphyses of same;  $\times 300$ ;—Fig. 45, *Aulographum vagum*, Desm., plants on portion of a leaf of goat-willow; nat. size;—Fig. 46, two plants of same; slightly  $\times$ ;—Fig. 47, ascus and paraphyses of same;  $\times 300$ ;—Fig. 48, *Pseudographis pinicola*, Rehm., plants; nat. size;—Fig. 49, one plant of same; slightly  $\times$ ;—Fig. 50, ascus and paraphyses of same;  $\times 300$ ;—Fig. 51, *Colpoma degenerans*, Mass., spores;  $\times 300$ ;—Fig. 52, *Propolis faginea*, Karst., group of plants; nat. size;—Fig. 53, two plants of same; slightly  $\times$ ;—Fig. 54, section of same; slightly  $\times$ ;—Fig. 55, ascus and paraphyses of same; highly  $\times$ ;—Fig. 56, free spores of same;  $\times 300$ .

A.—*Spores coloured.*

## FARLOWIA. Sacc. (figs. 5-9, p. 22.)

Ascophore elongated, dehiscing by a long, narrow slit, lips obtuse, black, rigid; asci elongated; spores continuous, coloured; paraphyses present.

*Farlowia*, Sacc., Syll., vol. ii. p. 727.

Readily distinguished from every other genus by the continuous, coloured spores.

***Farlowia repanda.*** Sacc., Syll., n. 5566. (figs. 5-9, p. 22.)

Ascophore rather broadly elliptical, straight or rarely slightly curved, ends rather obtuse, up to 1 mm. long, dehiscing by a narrow slit, lips convex, obtuse, smooth, dull black; asci cylindric-clavate, spores 8, obliquely uniseriate or sometimes more or less biseriate towards the apex of the ascus, elliptical, slightly inequilateral, smooth, pale, then deep brown, with a more or less developed hyaline basal papilla, usually 1-guttulate,  $15-17 \times 6-8 \mu$ ; paraphyses numerous, filiform,  $2 \mu$  thick, sparingly septate, very slightly thickened, and sometimes branched above, tinged with olive.

*Hysterium repandum*, Bloxam in Duby, Hyst., p. 27, t. 1, f. 6; B. & Br., Ann. Nat. Hist., ser. iii., vol. xviii., p. 15, pl. 5, f. 38 (n. 1181); Cke., Hdbk., p. 758.

On rotten wood, stumps, &c.

Gregarious, lying at all angles. Superficially indistinguishable from the many species belonging to other genera, but readily known under the microscope by the continuous brown spores with a minute, colourless, basal apiculus.

Bloxam's type specimen examined.

## MYTILIDION. Duby. (figs. 39-41, p. 22.)

Ascophore sessile, mussel-shaped, dehiscing by a narrow, longitudinal slit; vertical, laterally compressed, thin, carbonaceous and fragile, black; asci subcylindrical or clavate,



8-spored, paraphyses filiform, septate, hyaline, branched above; spores more or less elongato-fusiform, 3-7-septate, biseriate, coloured when mature.

*Mytilidion* (erroneously written *Mytilinidion*), Duby, Mém. Hyster., p. 62; Sacc., Syll., ii. p. 760.

*Lophium* resembles the present genus in the mussel-shaped ascophore, but is at once distinguished by the long, filiform, hyaline spores. *Hysterium* differs in the ascophore not being mussel-shaped.

\* *Spores 3-septate.*

***Mytilidion laeviusculum.*** Sacc., Syll., n. 5704. (figs. 39-41, p. 22.)

Gregarious, sessile on a broad base, mussel-shaped, vertical and laterally compressed, black, almost smooth, lips thin and closed at first, then slightly gaping; cells of excipulum small, blackish externally, forming a compact, parenchymatous tissue; asci clavate, apex rather acute, narrowed below into a somewhat slender pedicel; spores 8, irregularly biseriate, narrowly fusiform, straight or sometimes with a very slight suggestion of becoming sigmoid, 3-septate, smooth, very pale yellowish brown at maturity;  $15-20 \times 2.5 \times 3.5 \mu$ ; paraphyses numerous, very slender,  $1.5 \mu$  thick, septate, branched above.

*Lophium laeviusculum*, Karsten, Symb. Myc. Fam., p. 261.

On worked pinewood.

Gregarious, mostly with the long axis of the fungus parallel to the grain of the wood. Specimen examined from Karsten's Fung. Fenn., n. 771.

*Forma minor*: asci and spores a trifle smaller than in the typical form.

On pine leaves.

\*\* *Spores 5-7-septate.*

***Mytilidion gemmigenum.*** Fuckel, Symb. App. i., p. 299; Sacc., Syll., n. 5711.

Somewhat gregarious or more frequently scattered, not seated on a black stain, superficial, vertical, not much compressed, ends obtuse, slightly striate transversely, upper edge obtuse, slit very narrow, black,  $1-1\frac{1}{4}$  mm. long,  $\frac{1}{2}$  mm. broad, up to 1 mm. high; asci cylindrical, apex rounded, base nar-

rowed into a pedicel; spores 8, elongated fusiform or slightly clavate, mostly straight, colourless at first then brownish yellow, 7-septate, irregularly biseriate,  $30-36 \times 6 \mu$ ; paraphyses very slender, about  $1.5 \mu$  thick, colourless, branched.

*Mytilidion fusisporum*, Sacc., Syll., n. 5712.

*Lophium fusisporum*, Cooke.

*Lophium mytilinum*, Cooke, Fung. Brit. exs., ser. ii., n. 200.

On small branches of larch, spruce, &c.

Distinguished from *M. laeviusculum* by the greater number of septa in the spore. The ascophores are truly perennial, and probably produce a new crop of asci each year.

An authentic specimen from Fuckel examined; Cooke's types also examined.

### HYSTERIUM. Tode. (figs. 13-16, p. 22.)

Ascophore erumpent or subsuperficial, oblong, elliptical, or linear, black, rigid, dehiscing by an elongated, narrow slit, lips obtuse; cells of epithecium small, compact, blackish olive externally; asci clavate; spores 8, elongated, 3-7-septate and coloured brown or yellowish at maturity; paraphyses slender, branched and coloured at the apex.

*Hysterium*, Tode, Mecklenb., ii. p. 4; Sacc., Syll., ii. p. 743; Cke., Hdbk., p. 757.

The species included in the present genus superficially resemble the species belonging to other genera, but are clearly distinguished under the microscope by the coloured, 2 or more septate spores. *Mytilidion* differs in the mussel-shaped ascophore.

***Hysterium pulicare.*** Pers., Syn. Fung., p. 98; Cke., Hdbk., p. 757; Sacc., Syll., n. 5634. (figs. 13-16, p. 22.)

Scattered or gregarious, almost superficial form somewhat variable, for the most part broadly elliptical or almost oblong, ends very obtuse, hard, dull black, longitudinally striate, depressed above, lips very obtuse, slit very narrow, 1-2 mm. long by .5-1 mm. broad; asci clavate; spores 8, imperfectly biseriate near the apex of the ascus, often uniseriate below; elliptic-oblong, ends obtuse, straight or very slightly curved, 3-septate at maturity, brown, the two end-cells much paler

than the two middle ones, also a little smaller,  $24-30 \times 7-9 \mu$ ; paraphyses slender, branched and tinted with olive at the apex.

On the bark of various trees, oak, chestnut, walnut, birch, poplar, &c.

Specimen examined from Fries' Sclerom. Succ., n. 61.

The spores are somewhat variable, the most general and typical form being the one described above. Sometimes all four cells of the spores are coloured dark brown, sometimes three only, one end-cell alone remaining paler. Sometimes 1 septum only is present at maturity, sometimes 2; in very rare cases 4 septa are present.

**Hysterium angustatum.** A. & S., Consp. Fung. Nisk., p. 55; Cke., Hdbk., p. 758; Sacc., Syll., n. 5636; Rehm, Krypt.-Flora, Hyst., p. 14.

Ascophores gregarious or crowded, often parallel, at first partly immersed, then superficial, sessile, elliptical, sometimes very short and almost round, straight or slightly curved, almost smooth, black, opaque, slit closed, 1-3 mm. long,  $\frac{1}{2}-\frac{3}{4}$  mm. broad; asci clavate, wall thick upwards, 8-spored; spores elongated elliptical, ends rounded, 3-septate, rarely more, pale brown at maturity, smooth, cells usually 1-guttulate,  $17-25 \times 6-7 \mu$ ; paraphyses slender, branched above.

On the bark of various trees, as oak, birch, &c.

*H. pulicare* superficially resembles the present species, but is distinguished by the two end-cells of the spores being paler in colour than the central ones.

Specimen in Rehm's Ascom., n. 214, examined.

### OSTREION. Duby. (fig. 31, p. 22.)

Ascophore superficial, oyster-shaped, rather narrowed at the base or substipitate, vertical, laterally more or less compressed, black, dehiscing by a narrow, elongated slit, carbonaceous; asci subcylindrical, usually 4-spored; spores very large, elongated, coloured, multiseptate and muriform; paraphyses present.

*Ostreion*, Duby, Hyst., p. 21 (incorrectly written *Ostreichnion*); Sacc., Syll., ii. p. 765.

Readily distinguished by the oyster-shaped ascophore, and the very large, coloured, muriform spores.

**Ostreion americanum.** Duby, Hyst., p. 22, t. 1, fig. 1; Sacc., Syll., n. 5715. (fig. 31, p. 22.)

Ascophores scattered, oyster-shaped, black, rather shining, indistinctly transversely striate, slit narrow, edge obtuse, 2 mm. long; asci cylindrical, narrowed at the base; apex obtuse, 4-spored, rarely containing 3 or 5 spores; wall rather thin; spores elongato-fusoid, ends rather acute, slightly constricted at the middle, multiseptate and muriform, dark brown and almost opaque at maturity, a minute cell at each end paler,  $90-110 \times 25-28 \mu$ ; paraphyses numerous, very slender, about  $1\frac{1}{2} \mu$  thick, everywhere equal, much branched, hyaline, flexuous.

On bark.

The ascophore is usually straight, but sometimes slightly curved, or even showing an approach to a triradiate arrangement of the slit. Very brittle and carbonaceous.

An American specimen from Curtis examined, with which British specimens exactly agree.

### HYSTEROGRAPHIUM. Corda. (figs. 32-33, p. 22.)

Ascophore erumpent or superficial, sessile, black, firm and rigid, dehiscing by a longitudinal slit, lips obtuse; asci clavate, 8-spored; spores biseriate, smooth, 3-multiseptate then muriform, brown or olivaceous; paraphyses present.

*Hysterographium*, Corda, Icon., v. p. 34 (in part); Sacc., Syll., ii. p. 776.

*Hysterium*, of some authors.

Differs from *Gloniopsis*, its nearest ally, in having coloured spores.

\* *Spores 5-septate.*

**Hysterographium Rousselii.** Sacc., Syll., ii. n. 5768; Rehm, Krypt.-Flora, Hyst., p. 21.

Ascophore erumpent, sessile, black, linear-oblong, generally gregarious and arranged in parallel series, depressed, straight or very slightly bent, 1-3 mm. long,  $\frac{1}{2}$ -1 mm. broad, lips

very obtuse, slit narrow; asci more or less cylindrical, slender, 8-spored; spores uniseriate or sometimes with an approach to a biseriate arrangement above, elliptical, ends obtuse, constricted at the middle, 5-septate then muriform, clear olive-brown when mature,  $17-21 \times 7-10 \mu$ ; paraphyses slender, branched and tinged yellow towards the apex.

*Hysterium Rousselii*, De Notaris, Pir. Ist., p. 19; Cke., Hdbk., p. 758.

On old weathered pine planks, &c.

Readily distinguished by the narrow, cylindrical asci, and the small, few septate, constricted spores.

Specimen examined from Fuckel's Fung. Rhen., exs. n. 751.

**Hysterographium fraxini.** De Not., Pir. Ister., p. 22; Rehm, Krypt.-Flora, Hyst., p. 19; Sacc., Syll., ii. n. 5758. (figs. 32-33, p. 22.)

Scattered, or more frequently closely gregarious, lying at all angles, black, hard, erumpent, elliptical, ends usually obtuse, sometimes rather acute, lips rounded and obtuse, slit narrow, elongated,  $1\frac{1}{2}-2\frac{1}{2}$  mm. long by 1 mm. broad; asci broadly cylindric-clavate, apex rounded, base short, stout, thick-walled, 8-spored; spores elliptical, ends obtuse, scarcely or not at all constricted at the middle, about 5-septate then muriform, olive-brown at maturity,  $35-45 \times 15-20 \mu$ ; paraphyses slender, branched and tinged with brown at the apex.

*Hysterium fraxini*, Persoon, Synops. Fung., p. 98; Cke., Hdbk., p. 759, fig. 359.

On dry branches of ash, has also occurred in this country or elsewhere, on hazel, walnut, privet, beech, lilac, and *Viburnum*.

Distinguished from *H. elongatum* by the ascophores not being aggregated on a black stain, and by the spores having fewer septa, ends very obtuse, and not constricted at the middle.

**\*\* Spores 9-11-septate.**

**Hysterographium elongatum.** Corda, Icones., v. p. 77, t. ix. fig. 62; Sacc., Syll., ii. n. 5759; Rehm, Krypt.-Flora, Hyst., p. 19.

Gregarious, seated on an effused blackish stain formed by

brown hyphae, sessile, 3-4 mm. long by 1 mm. broad, black, oblong or elliptic-oblong, ends obtuse, slightly depressed, lips very obtuse, dehiscing by a narrow, longitudinal slit; asci clavate, thick-walled, 8-spored; spores biseriate, elongated elliptical, ends obtuse, usually more or less evidently constricted at the middle, 9-11-septate, then muriform, brown, almost opaque when quite mature, smooth,  $38-45 \times 12-16 \mu$ ; paraphyses filiform, branched, thickened, and coloured above.

*Hysterium elongatum*, Wahlenberg, Flor. Lap., p. 528; Cke., Hdbk., p. 759.

On various kinds of decorticated wood, as willow, poplar, oak, buckthorn, &c.

Specimen in Fries' Scler. Suec., n. 62, examined.

Ascophore usually straight, rarely slightly bent, often very indistinctly longitudinally striate. Hyphae of the subiculum  $4 \mu$  thick, dark brown, septate, branched.

#### B.—*Spores hyaline.*

#### ACTIDIUM. Fries. (figs. 17-20, p. 22.)

Ascophore sessile, stellate with from 3-5 rays; dehiscence by means of a long slit along each ray and meeting at the centre; black, somewhat carbonaceous; asci cylindric-clavate; spores 8, biseriate, hyaline, 1-septate; (paraphyses always absent?).

*Actidium*, Fries, Obs. Myc., i. p. 190; Cke., Hdbk., p. 766; Sacc., Syll., ii. p. 738.

Distinguished by the linear, hyaline, 1-septate spores, and the ascophore branched in a radiate or stellate manner with 3-5 subequal rays. Branched ascophores occur in species belonging to other genera, but the branching is scanty and the arms of unequal length, the spores are also different. The ascophores of the present species resemble a star-fish in miniature.

*Actidium hysteroioides*. Fries, Syst. Myc., ii. p. 96; Cke., Hdbk., p. 766, fig. 363; Sacc., Syll., ii. n. 5614. (figs. 17-20, p. 22.)

Ascophore radiato-stellate, 3-5 rayed, black, dehiscing by

a narrow slit along each ray, about  $\frac{1}{3}$  mm. across, smooth, somewhat carbonaceous, cells of excipulum small, compact, blackish; asci cylindric-clavate, numerous; spores 8, bi-seriate, hyaline, cylindric-fusiform, 1-septate, very slightly constricted at the septum,  $12-14 \times 2 \mu$ ; paraphyses absent.

On decorticated wood of pine, yew, &c.

Gregarious in small groups, very minute; one or more of the rays of the ascophore are sometimes slightly branched.

The asci and spores as described above were from a specimen in Fries' Scler. Suec., n. 63.

### AULOGRAPHUM. Lib. (figs. 45-47, p. 22.)

Ascophore not perennial, minute, black, linear, simple or branched, innate, epithecium membranaceous, cells minute, forming a compact parenchymatous tissue; dehiscing by a very narrow, longitudinal slit; asci broadly clavate or obovate, sessile, base not at all or only slightly attenuated, 8-spored; spores hyaline, elliptical or slightly clavate, 1-septate; paraphyses scanty, branched, septate, hyaline, absent in some species.

*Aulographum*, Libert, Crypt. Ard., n. 271; Rehm, Krypt.-Flora, Hyst., p. 8; Sacc., Syll., ii. p. 727.

*Hysterium* of many old authors.

*Ailographum*, Cke., Hdbk., p. 765.

Closely allied to *Glonium* in the 1-septate spores, minute size, habit, &c., but distinguished more especially by the membranaceous ascophore.

***Aulographum vagum*.** Desm., Ann. Sci. Nat., ser. ii. vol. xix. p. 362; Rehm, Krypt.-Flor., Hyster., p. 8, figs. 1-4, p. 4; Sacc., Syll., vol. ii. n. 55-67. (figs. 45-47, p. 22.)

Ascophore subinnate, black, sessile, very minute, linear, simple or branched,  $\frac{1}{4}-\frac{1}{3}$  mm. long by  $\frac{1}{8}$  mm. broad, membranaceous, lips somewhat cristate; asci elliptical, sessile, 8-spored, rather thick walled; spores 2-3-seriate, elongato-clavate, apex rounded, hyaline, smooth, straight or somewhat curved, 1-septate, usually each cell 1-2-guttulate,  $9-12 \times 2.5-3.5 \mu$ ; paraphyses scanty, about  $2 \mu$  thick, septate, branched above and thickened at the tips, colourless.



*Ailographum vagum*, Cke., Hdbk., p. 765.

On dry coriaceous leaves, as ivy, holly, &c.

Very minute and scarcely visible to the naked eye, occurring on both surfaces of the leaf, scattered or gregarious, and sometimes confluent.

Specimen examined from Desmazières' Crypt. France, ser. i., n. 1529.

*Doubtful species.*

*Aulographum maculare*. B. & Br., On Brit. Fung., n. 968, in Ann. Nat. Hist., 1861, p. 13, pl. 16, f. 20; Sacc., Syll., ii. n. 5578; Cke. Hdbk., p. 765, fig. 362.

Ascophores for the most part simple, grouped in orbicular spots with a tendency to become concentrically arranged; asci short, oblong; spores oblong-clavate.

On an old mat made of *Typha*.

Forming little orbicular black patches, in which the perithecia are dispersed in a somewhat concentric fashion; perithecia mostly simple; asci short, oblong; sporidia oblong-clavate, 0.0005 inch long (= about 13  $\mu$ ). Mycelium matted, brown, producing here and there dark patches. (B. & Br.)

I cannot find fruit in Berkeley's type specimens, consequently it is uncertain as to whether the spores are 1-septate or continuous; the blackest patches are up to 1 cm. across, and due to brown, branched, septate hyphae, 3-4  $\mu$  thick; ascophores rarely branched, narrowly elliptical; ends usually rather acute, up to  $\frac{2}{3}$  mm. long.

GLONIUM. Mühl.

Perithecia innate then emergent, narrow and elongated, rarely oblong or orbicular, sometimes radiately arranged, carbonaceous or horny-membranaceous, black, sometimes seated on an interwoven layer of brown, septate hyphae, dehiscing by a narrow, longitudinal slit; asci cylindrical or clavate, 8-spored; spores 1-2-seriate, 1-septate, smooth, hyaline, rarely pale brown at maturity; paraphyses slender, usually branched and coloured at the apex.

*Glonium*, Mühlenb., Cat. Am., p. 101; Réhm., Krypt.-Flora, Hyst., p. 10; Sacc., Syll., ii. p. 731.

*Hysterium*, of many authors.

Distinguished by the elongated, narrow, carbonaceous ascophore, and the hyaline, 1-septate spores. In one British species the spores are pale brown.

**Glonium lineare.** De Notaris, Giorn. Bot. Ital., ii. p. 594; Sacc., Syll., n. 5588; Rehm, Krypt.-Flora, Hyst., p. 10.

Sometimes scattered, but usually densely gregarious, and parallel, forming black patches, semi-immersed, linear, straight or curved, ends obtuse, opaque black, lips very slightly tumid, slit narrow, 2-6 mm. long,  $\frac{1}{2}$ - $\frac{1}{3}$  mm. broad, carbonaceous; asci cylindric-clavate, apex rounded, 8-spored; spores irregularly uniseriate, broadly elliptical, 1-septate, the apical cell broader than the basal one, smooth, hyaline, 12-14  $\mu$  long, upper cell 7-8  $\mu$  broad; paraphyses filiform, septate, branched and coloured above.

*Hysterium lineare*, Fries, Vet. Akad. Handl., 1819, p. 92; Cke., Hdbk., p. 760.

*Hysterium confluens*, Wallr., Fl. Crypt., ii. p. 440.

On naked wood of various kinds.

Usually densely crowded and staining the wood black, only very slightly prominent. Often very long; Rehm says 3-20 mm. long.

Specimen in Fries' Scler. Suec., n. 90, examined.

**Glonium amplum.** Duby, Hyst., p. 37; Rehm, Krypt.-Flora, Hyst., p. 12; Sacc., Syll., ii. n. 5609.

Generally densely crowded and forming black patches, seated on a subiculum of brown, septate, branched hyphae, 3-4  $\mu$  thick; ascophore blackish-brown, nearly circular, slightly depressed, sometimes slightly curved or with a tendency to branch, slit very narrow, up to 1.5 mm. long, ends rounded; asci clavate, wall thick upwards, 8-spored; spores irregularly 2-seriate, fusiform, 1-septate, slightly constricted at the septum, clear pale brown at maturity, each cell usually 1-guttulate; paraphyses slender, branched above.

*Aulographum amplum*, B. & Br., n. 782, in Ann. Nat. Hist., vol. xiii.

*Hysterium amplum*, Cke., Hdbk., p. 760.

On dead bramble stems.

Type specimens examined.

A well-marked species, usually densely gregarious and pointing in all directions. The matrix is blackened by the dark hyphae of the subiculum.

### HYPODERMA. D. C.

Ascophores innate, oblong or elliptical, blackish, at first covered by the epidermis, thin and membranaceous, dehiscing by a narrow, longitudinal slit; asci clavate, apex narrowed, base contracted into a slender stem, 8-spored; spores slenderly cylindrical or fusiform, much shorter than the ascus, multiguttulate then often 2-4-septate, hyaline, arranged in a fascicle in the upper wide part of the ascus; paraphyses filiform, septate, apex often wavy.

*Hypoderma*, D. C., Flor. France, ii. p. 304; Rehm, Krypt.-Flora, Hyst., p. 32; Sacc., Syll., ii. p. 784.

*Hysterium*, of some authors.

Allied to *Lophodermium* in habit, and in the thin, membranaceous excipulum, but distinguished by the shorter and thicker spores.

***Hypoderma commune*.** Duby, Mém. Hyst., p. 41; Rehm, Krypt.-Flora, Hyst., p. 32; Sacc., Syll., n. 5797.

Scattered, innate, roundish or elliptical, ends obtuse, opaque, black, lips rugulose, at length slightly gaping and exposing the dingy disc, up to 1.5 mm. long; asci ovately clavate, apex rounded, attenuated below into a slender stem, very delicate, 8-spored; spores narrowly cylindrical or very slightly fusiform, ends blunt, straight, smooth, hyaline, becoming 1-septate at maturity,  $18-22 \times 4-5 \mu$ , grouped in a more or less parallel fascicle in the widest part of the ascus; paraphyses delicate and slender, straight or wavy at the tip.

*Hysterium commune*, Fries, Syst. Myc., ii. p. 589; Cke., Hdbk., p. 761.

On dry stems of herbaceous plants, hop, willow-herb, aconite, *Artemisia*, &c.

*Spermogonia*. Minute, roundish, shining black, rugulose; spermatia elongated, ends blunt, hyaline, straight or curved, continuous,  $7 \times 1.5-2 \mu$ .

*Leptostroma vulgare*, Fries, Syst. Myc., ii. p. 599.

*Leptothyrium vulgare*, Sacc., Syll., iii. p. 633.

**Hypoderma hederæ.** De Not., Pir. Ist., p. 36; Rehm, Krypt.-Flora, Hyst., p. 33; Sacc., Syll., ii. n. 5783.

Ascophores scattered on pale spots, innato-superficial, elliptical, shining black, lips at first acute and closed, then gaping and exposing the yellowish then brown disc, 1-2 mm. long; asci clavate, rather narrowed at the apex, and attenuated into a long stipitate base, 8-spored; spores narrowly elliptic-oblong, ends obtuse, straight or rarely very slightly bent, for a long time continuous, then indistinctly 1-septate,  $15-17 \times 4-5 \mu$ , hyaline, collected in a fascicle near the apex of the ascus; paraphyses slender, apex curled.

*Hysterium hederæ*, Mart., Flor. Erlang., p. 472; Cke., Hdbk., p. 761.

On dry ivy leaves.

Specimen in Fuckel's Fung. Rhen., n. 756, examined.

**Hypoderma virgultorum.** D. C., forma rubi D. C., Flor. France, vi. p. 165; Rehm, Krypt.-Flora, Hyst., p. 33; Sacc., Syll., n. 5792.

Scattered, subinnate, arranged parallel to the long axis of the branch on which they are growing, narrow and elongated, 1-2 mm. long, shining black, slit narrow at first, then gaping and exposing the grey disc; asci clavate, apex narrowed, attenuated below into a slender pedicel, 8-spored; spores narrowly elliptic-fusiform, ends blunt, straight or very slightly curved or sigmoid, at first continuous and 2-guttulate, then 1-septate, hyaline,  $20-25 \times 3-4 \mu$ , arranged in an irregular manner in the widest part of the ascus; paraphyses slender, about  $2 \mu$  thick, apex more or less curved and curled, hyaline.

*Hysterium virgultorum*, Cke., Hdbk., p. 761.

On dead bramble stems.

According to Rehm the Spermogonia form is *Leptostroma virgultorum*, Sacc., Mich., ii. p. 350, with continuous spores measuring  $4-5 \times 1 \mu$ .

**Hypoderma conigenum.** Cke., Hdbk., p. 762; Rehm Krypt.-Flora, Hyst., p. 35; Sacc., Syll., ii. n. 5791.

Crowded, erumpent, at first rounded then elongated

smooth, black and shining, margin pale, splitting by a longitudinal fissure, about  $\frac{1}{2}$  mm. long and  $\frac{1}{4}$  mm. broad; asci clavate, attenuated below into a long, slender pedicel, 8-spored; spores filiform or slightly fusiform, usually curved, continuous, multiguttulate, hyaline,  $20-25 \times 2.5-3 \mu$ , arranged in a parallel fascicle; paraphyses slender, more or less curved at the apex.

*Hysterium conigenum*, Pers., Syn. Fung., p. 102.

On fallen cones of Scotch fir. Confined to the upper exposed portion of the scales.

### LOPHIUM. Fries. (figs. 1-4, p. 22.)

Ascophore vertical, mussel-shaped, compressed laterally, submembranaceous, fragile, black; lips acute, at first in contact, then gaping slightly and dehiscing by a long, narrow slit; asci cylindrical, 8-spored; spores filiform, very long, multiseptate, arranged in a parallel fascicle, hyaline or with a yellow tinge; paraphyses slender, septate, branched, colourless.

*Lophium*, Fries, Syst. Myc., ii. p. 533; Sacc., Syll., ii. p. 799; Cke., Hdbk., p. 766.

Readily distinguished by the very long, needle-shaped, multiseptate spores, and the form of the ascophore, which almost exactly resembles in miniature, a mussel shell fixed by the hinge and standing vertically, with the slightly gaping lips above.

***Lophium mytilinum*.** Fries, Syst. Myc., ii. p. 533; Sacc., Syll., ii. n. 5838; Cke., Hdbk., p. 766, fig. 364. (figs. 1-4, p. 22.)

Ascophore mussel-shaped, subpedicellate, transversely striate, black, shining, about  $1\frac{1}{2}$  mm. long,  $\frac{1}{2}-\frac{2}{3}$  mm. high and broad; cells of excipulum small, very compact, blackish; asci cylindrical, shortly stipitate; spores 8, arranged in a parallel fascicle, nearly as long as the ascus, very slenderly needle-shaped, multiguttulate then more or less perfectly multiseptate, hyaline,  $120-150 \times 1.5-2 \mu$ ; paraphyses numerous, cylindrical, about  $2 \mu$  thick, septate, branched.

*Hysterium mytilinum*, Pers., Syn. Fung., p. 97.

On bark and wood of *Pinus* and *Abies*.

Gregarious, standing at all angles (*i.e.* not arranged in parallel series). Specimen examined from Fries' Scler. Suec., n. 60.

Most frequently springing from a black, more or less broadly effused stain in the matrix, caused by a mass of dark brown, interwoven, septate hyphae which give origin to the ascophores.

**Lophium elatum.** Greville, Scot. Crypt. Flo., p. 177, t. 177, fig. 2; Sacc., Syll., ii. n. 5840; Cke., Hdbk., p. 766.

Ascophore about  $1\frac{1}{2}$  mm. high, vertical, base cylindrical, narrow, gradually broadening out and becoming compressed upwards, lips thin, acute, slit very narrow, about  $\frac{1}{2}$  mm. across the apex; membranaceous, black, indistinctly transversely striate, springing from a web of brown hyphae at the base, which do not, however, form an effused black stain, the hyphae extend for some distance up the two opposite sides of the ascophore; asci narrowly cylindrical, 8-spored; spores needle-shaped, almost as long as the ascus,  $180-200 \times 1\frac{1}{2} \mu$ , multiseptate, straight, hyaline at first, becoming pale olive at maturity, arranged in a parallel fascicle; paraphyses very slender, equal, apex not thickened, branched,  $1-1\frac{1}{2} \mu$  thick, colourless.

On naked wood or bark.

The specimens generally originate in groups of two to four, more or less connate at the base and springing from dark brown hyphae.

Specimen from Scotland, now in Herb. Berk., Kew; examined. There is no name on the specimen, but the word "Scotland" is in Greville's handwriting; hence the specimen may be accepted as authentic.

Black, erect, about a line high, stipitate; the stalk nearly cylindrical at the base, very gradually dilating and passing into the compressed, transversely striated, black, wedge-shaped perithecium; the whole very similar to the head of a long-shaped hatchet. (Greville.)

## LOPHODERMIUM. Chev.

Ascophore innate, more or less elliptical, membranaceous, black, dehiscing by a narrow longitudinal slit; asci clavate, often narrowed at the apex, 8-spored; spores needle-shaped, nearly as long as the ascus, hyaline, guttulate, arranged in a parallel fascicle in the ascus; paraphyses slender, often wavy at the apex.

*Lophodermium*, Chev., Flor. de Paris, i. p. 436; Rehm, Krypt.-Flora, Hyst., p. 37; Sacc., Syll., ii. p. 791.

*Hysterium*, of many authors.

Distinguished by the membranaceous excipulum, and the parallel fascicle of hyaline, continuous, needle-shaped spores, almost as long as the ascus.

The ascophores are often gregarious on bleached spots on dead leaves or stems.

A.—On *Monocotyledons*.

**Lophodermium typhinum.** Lambotte, Flor. Myc. Belg., ii. p. 590; Rehm, Krypt.-Flora, Hyst., p. 47; Sacc., Syll., ii. n. 5832.

Gregarious, elliptic-oblong, ends blunt, the long axis always parallel to the long axis of the leaf, covered by the epidermis, at length naked, black, lips slightly swollen, slit narrow, 1–4 mm. long; asci cylindric-clavate, thick-walled above, apex narrowed, 8-spored; spores needle-shaped, hyaline, continuous, slightly curved, nearly as long as the ascus, arranged in a parallel fascicle; paraphyses slender, about 2  $\mu$  thick, longer than the asci, tips wavy, hyaline.

*Hysterium typhinum*, Cke., Hdbk., p. 764.

On dead leaves of *Typha latifolia* and *T. angustifolia*.

Specimen determined by Berkeley, examined.

**Lophodermium arundinaceum.** Chev., Flor. Paris, p. 435; Rehm, Krypt.-Flora, Hyst., p. 45; Sacc., Syll., ii. n. 5823.

Scattered or gregarious, innate, more or less prominent,



then depressed, rugulose, brownish-black, elliptical, straight, up to 2 mm. long, slit narrow at first, then gaping and exposing the pallid brown disc, closing when dry; asci clavate, apex narrowed, 8-spored; spores needle-shaped, straight or slightly curved, continuous, multiguttulate, hyaline,  $50-80 \times 1.5-2 \mu$ , arranged in a parallel fascicle; paraphyses filiform, about  $2 \mu$  thick, hyaline, apex more or less curled.

*Hysterium arundinaceum*, Schrad., Journ. Bot., ii. p. 68, t. 3, fig. 3; Cke., Hdbk., p. 763.

On sheaths and leaves of various grasses.

*Spermogonia*. Perithecia oblong, ends obtuse, depressed, black, readily falling away from the matrix, sulcate; spores needle-shaped, continuous, hyaline,  $16-18 \mu$  long.

*Leptostromella hysterioides*, var. *graminicolum*, De Notar., Micr. Ital., iii. f. 6; Sacc., Syll., iii. n. 3513.

## B. On Dicotyledons.

### \* Angiosperms.

**Lophodermium cladophilum.** Rehm, Krypt.-Flora, Hyst., p. 42.

Ascophores scattered or gregarious, up to  $\frac{3}{4}$  mm. long,  $\frac{1}{3}$  mm. broad, seated on a brownish spot, arranged at all angles, convex, bursting through a long slit in the cuticle, straight, blackish; asci cylindric-clavate, apex narrowed, 8-spored; spores needle-shaped, arranged in a parallel fascicle, almost as long as the ascus, hyaline, continuous, straight, multiguttulate,  $40-50 \times 1 \mu$ ; paraphyses very slender, almost straight, colourless.

*Hysterium cladophilum*, Lév. in Moug. and Nest., Stirp. Vog., n. 1243.

*Sporomega cladophila*, Duby, Mem. Hyst., p. 48; Cke., Hdbk., p. 764, fig. 360; Sacc., Syll., ii. n. 5846.

*Hysterium Vaccinii*, Carm., Engl. Flora, vol. v. p. 295.

On dry stems of *Vaccinium myrtillus*.

In its early stage of growth it appears like a brown spot, as it swells the cuticle is raised up, and at length splits longitudinally, and for a long time closely covers the two lobes of the perithecium. (Berk.)

**Lophodermium maculare.** De Notaris, Piren. Ister., p. 40; Rehm, Krypt.-Flora, Hyst., p. 39; Sacc., Syll., ii. n. 5810.

Seated on bleached spots, usually bounded by a black line, innate, rather flattened, elliptic or roundish,  $\frac{1}{2}$ –1 mm. long, ends obtuse, up to  $\frac{2}{3}$  mm. wide, black, dehiscing by a longitudinal slit, lips rufescent; asci clavate, apex narrowed, 8-spored; spores filiform, continuous, hyaline, often curved,  $30\text{--}50 \times 1\text{--}1.5 \mu$ , arranged mostly in a parallel fascicle; paraphyses filiform, hooked or wavy at the tip, colourless.

*Hysterium maculare*, Fries, Syst. Myc., ii. p. 592.

*Hysterium (Lophodermium) maculare*, Cke., Hdbk., p. 762.

Specimen from Fries examined.

On dry leaves of *Vaccinium*.

**Var. ilicinum.** Ascophores gregarious on pale spots on dry oak leaves,

*Hypoderma ilicinum*, De Notaris, Pir. Ist., p. 35; Sacc., Syll., ii. n. 5784.

*Hysterium ilicinum*, Cke., Hdbk., p. 760.

Specimen in Berk., Brit. Fung. Exs., n. 95, examined.

**Lophodermium melaleucum.** De Not., Piren. Ister., p. 40; Rehm, Krypt.-Flora, p. 38; Sacc., Syll., ii. n. 5809.

Gregarious on clear patches, roundish or elliptical, ends obtuse, straight, black, up to 1 mm. long.  $\frac{1}{2}$ – $\frac{3}{4}$  mm. broad, opening by a narrow longitudinal slit, lips whitish; asci cylindric-clavate, 8-spored; spores filiform, straight, continuous, hyaline,  $50\text{--}55 \times 1.5\text{--}2 \mu$ , arranged in a parallel fascicle; paraphyses slender, about  $2 \mu$  thick, hyaline, more or less curved at the tip.

*Hysterium melaleucum*, Fries, Obs. Myc., i. p. 192, t. ii. fig. 1.

*Hysterium (Lophodermium) melaleucum*, Cke., Hdbk., p. 762.

On the under surface of dry leaves of *Vaccinium*.

**Var. pulchellum**, Fries, Syst. Myc., ii. p. 582.

Lips of a distinct yellow-green colour; otherwise as in typical form.

**Lophodermium hysterioides.** Sacc., Syll., ii. n. 5808; Rehm, Krypt.-Flora, Hyst., p. 38.

Ascophores scattered on pale spots, innately superficial,

elliptic and obtuse, or roundish, slightly convex, even, black, opaque, slit narrow, up to 1 mm. long; asci clavate, apex rather narrowed, base narrowed into a slender pedicel, 8-spored; spores needle-shaped, continuous, hyaline, nearly as long as the ascus,  $65-75 \times 1.5 \mu$ , arranged in a parallel fascicle in the ascus, curved when free; paraphyses filiform, hooked at the apex, hyaline.

*Xyloma hysterioides*, Pers., Syn. Fung., p. 106.

*Hysterium xylomoides*, Cke., Hdbk., p. 762.

On dry leaves of hawthorn and other rosaceous plants, also on leaves of barberry.

Specimen in Berk. Fung. Exs., n. 196, examined.

### \*\* *Gymnosperms.*

**Lophodermium pinastri.** Chev., Flor. Paris, i. p. 430; Rhem, Krypt.-Flora, Hyst., p. 43; Sacc., Syll., ii. n. 5819.

Epiphyllous, scattered on pale spots that are often bounded by a thin black line, innate, shortly elliptical or roundish, brownish then shining black, slit at length gaping and exposing the livid disc,  $1-2.5 \times 1$  mm.; asci clavate, apex rather narrowed, 8-spored; spores needle-shaped, hyaline, continuous, multiguttulate, nearly as long as the ascus, straight or slightly curved,  $90-120 \times 1.5 \mu$ , arranged in a parallel fascicle in the ascus; paraphyses filiform, about  $2.5 \mu$  thick, apex slightly wavy, colourless.

*Hysterium pinastri*, Schrad., Journ. Bot., ii. p. 69, t. 3, — ?  
fig. 4; Cke., Hdbk., p. 763.

On fallen leaves of Scotch fir or other conifers.

*Spermogonia.* Spores cylindrical, colourless, continuous,  $6-8 \times 1 \mu$ .

*Leptostroma pinastri*, Desm., Ann. Sci. Nat., 1843, p. 338.

**Lophodermium juniperinum.** De Not., Pir. Ist., p. 40; Sacc., Syll., n. 5820; Rehm, Krypt.-Flora, Hyst., p. 44.

Scattered on the under surface of the leaf, innate and slightly protruding, convex or almost plane, roundish or elliptical, ends blunt, blackish-brown, lips smooth, slit long and narrow,  $\frac{1}{2}-1$  mm. long; asci clavate, sessile, apex rather

narrowed, 8-spored; spores needle-shaped, straight or slightly curved, hyaline, multiguttulate, then indistinctly multiseptate, arranged in a parallel fascicle; paraphyses filiform, up to  $2\ \mu$  thick, colourless.

*Hysterium pinastri*  $\beta$  *juniperinum*, Fries, Syst. Myc., ii. p. 588.

*Hysterium juniperinum*, Cke., Hdbk., p. 763.

On dry leaves of *Juniperus communis* and *J. Sabina*.

Specimen examined in Cke., Fung. Brit., Exs. 395, and Rehm, Ascom., n. 128.

### GLONIOPSIS. De Not. (figs. 36-38, p. 22.)

Ascophore erumpent, becoming almost superficial, elongated or linear, sessile, dehiscing by a longitudinal, narrow slit, lips obtuse; black, carbonaceous; asci cylindric-clavate, 8-spored, wall thick; spores elongated, septate then muriform, persistently hyaline; paraphyses slender, branched above.

*Gloniopsis*, De Notaris, Pir. Ister., p. 23; Sacc., Syll., vol. ii. p. 772.

*Hysterographium*, Rehm, Krypt.-Flora, Hyst., p. 17.

*Hysterium*, of old authors.

Agreeing in general structure with *Hysterographium*; differing in the persistently colourless spores.

***Gloniopsis curvata*.** Sacc., Syll., ii. n. 5756. (figs. 36-38, p. 22.)

Ascophore bursting through the bark, then almost superficial, prominent, gregarious, linear, straight or curved, 1-5 mm. long,  $\frac{1}{2}$ - $\frac{3}{4}$  mm. broad, black, somewhat shining, hard, indistinctly longitudinally striate, slit narrow, lips rounded; asci cylindric-clavate, apex rounded, base short, stout, wall thick; spores 8, irregularly biseriate, elliptical, slightly or not at all constricted at the middle, 5-7-septate then muriform, persistently hyaline, smooth,  $15-19 \times 6-8\ \mu$ , paraphyses filiform, branched and tinged with yellow above.

*Hysterium elongatum*  $\beta$  *curvatum*, Fries, Elench. Fung., ii. p. 138.

*Hysterium curvatum*, Cke., Hdbk., p. 759.

*Hysterographium curvatum*, Rehm, Krypt.-Flora, Hyst., p. 17.

*Hysterium naviculare*, Walbr., Fl. Crypt. Germ., ii. p. 441.

On dry branches of rose, bramble, sloe, and hawthorn.

When growing on rose stems the ascophores are mostly parallel, but on other plants they frequently stand at all angles.

Specimen named by Fries examined.

### DICHAENA. Fries. (figs. 10-12, p. 22.)

Mostly gregarious and clustered in irregular patches, at first closed, roundish or elongated, then opening by an elongated slit, blackish brown; asci obpyriform or broadly fusiform, 4-8-spored; spores elliptical, at first one- then many-celled, colourless, grouped without order in the ascus; paraphyses slender.

*Dichaena*, Fries, Summa Veg. Scand., p. 403; Sacc., Syll., ii. p. 771.

The species included in the present genus are true parasites, growing on the living bark of the host-plant. Although some of the species, as *D. quercina*, are exceedingly common, yet the fruiting stage is rare, and in some species unknown.

*Dichaena quercina*. Fries, Elench., ii. p. 142; Sacc., Syll., ii. (figs. 10-11. p. 22.)

Ascophores grouped into dense, irregular patches, of variable size,  $\frac{1}{2}$ -5 cm. across, blackish-brown, form variable, blackish brown, roundish at first, then elongated, ends obtuse, flattened, dehiscing by a longish slit,  $\frac{1}{2}$ -1 mm. long,  $\frac{1}{3}$  mm. broad, membranaceous; asci broadly obpyriform, sessile; spores 8, broadly elliptical, at first one- then many-celled or parenchymatous, hyaline,  $22-25 \times 8-10 \mu$ , inordinate; paraphyses filiform, about  $2 \mu$  thick, agglutinated together.

*Opegrapha quercina*, Pers., Annal. Bot., vii. p. 31, t. 3, f. 4.

On oak branches, on the living bark.

A very common species, but usually barren.

The supposed pycnidia form of this species resembles the ascigerous form in habit; the pycnidiophores are smaller,

and contain hyaline multinucleate spores,  $22-25 \times 8-10 \mu$ , borne on longish basidia.

*Psilospora quercina*, Rab.

**Dichaena faginea.** Fries, Elench., ii. p. 141; Rehm, Krypt.-Flora, Hyst., p. 51; Sacc., Syll., ii. n. 5737.

Growing on living bark; ascophore erumpent, becoming rather prominent, oblong, at length forming effused, rugulose patches.

*Hysterium fagineum*, Rabh., Pilze, p. 155.

On smooth, living beech bark.

Resembling *D. quercina* in habit and structure, but the perithecia are larger.

**Var. corylea**, Fries, Elench. Fung., ii. p. 142; Sacc., Syll., ii. n. 5737.

Ascophore smaller, slightly prominent, somewhat rounded, becoming confluent and forming prominent, rugulose patches.

On hazel bark.

**Var. capreae**, Rehm, Krypt.-Flora, Disc., p. 51, figs. 3-5, p. 49; Sacc., Syll., Suppl. ix. n. 4396. (fig. 12, p. 22.)

Ascophores gregarious on pale, roundish spots, immersed, bursting through the epidermis; roundish then elongated, obtuse, membranaceous, rugose, black,  $\frac{1}{2}$  mm. long,  $\frac{1}{4}-\frac{1}{3}$  mm. broad; ostiolum at first roundish then elongated, margin irregular, narrow; asci fusoid, base broad, sessile, 8-spored; spores hyaline, continuous, usually 1-guttulate then minutely granular, elliptic-oblong, ends obtuse,  $27-30 \times 12-14 \mu$ ; paraphyses filiform,  $2.5 \mu$  thick, tinged brown above.

On living bark of *Salix capraea*.

Usually only 3-4 spores attain their full development in an ascus. A doubtful *Dichaena* if the spores are permanently continuous.

**Dichaena strobilina.** Fries, Summa Veg. Scand., p. 40; Cke., Hdbk., p. 932, f. 406; Sacc., Syll., ii. n. 5738.

Gregarious, erumpent, somewhat irregular, roundish at first, rather soft, opaque brown then black, dehiscing by a narrow longitudinal slit; asci usually 8-spored; spores fusoid, slightly curved, 3-guttulate then 3-septate, hyaline, smooth,  $10-13 \mu$  long.

*Sphaeria strobilina*, Holle & Schw., Deutsche Schw. i. n. 8.

On scales of fallen fir-cones.

Not a good *Dichaena*, and requires to be examined in a living state.

*Pycnidia*. Perithecia gregarious, irregular; spores almond-shaped, hyaline, endochrome bipartite.

*Hendersonia strobilina*, Currey, Trans. Linn. Soc., vol. xxii. p. 329; Cke., Hdbk., p. 932.

*Stagonospora strobilina*, (Curr.) Sacc., Syll., vol. iii. n. 2457.

On scales of dry fir-cones.

## DISCOMYCETES.

The most important distinctive feature of the present great group consists in the disc or hymenium being fully exposed at maturity.

There is a very wide range in size, form, texture, and coloration, and as would be expected, there are transitions to allied groups at various points. Phacidieae present many features in common with the Hysteriaceae, differing mainly in the greater exposure of the disc. Sticteae and Ascoboleae together, in the frequent rudimentary condition of the ascophore, are in touch with the Gymnoascaceae. Finally the Pezizae, through such species as *Peziza vesiculosa*, and more especially *Sphaerosoma ostiolatum*, connect with the subterranean, indehiscent Tuberaceae.

Although not previously consistently included in a specific diagnosis, the structure of the *excipulum* proves to be of great value in the discrimination of closely allied species; and in future greater attention will probably be devoted to its structure. In the great majority of species, whatever the internal structure of the excipulum—or vegetative and protective cup-like portion surrounding the disc—may be, the external or outside portion shows a structure differing from the internal portion, and is spoken of as the *cortex*; the structure of this external or cortical portion is as a rule parenchymatous, or composed of larger parallel, septate hyphae than the innermost portion, and is usually coloured, and is the part intended when the structure of the excipulum



is mentioned in the present work, unless otherwise stated. In most of the minute species the structure of the external portion of the excipulum can be seen under the microscope without preparing a section; in the case of fleshy species a section is necessary.

The arrangement of the spores in the ascus, whether in a parallel fascicle or bundle, 1-seriate, or 2-seriate, is also an important feature, both specific and generic.

### Ord. DISCOMYCETES.

A. *Ascophore immersed in the matrix, minute, coriaceous or waxy.*

#### Fam. I. Phacidieae.

Ascophore minute, immersed in the matrix, more or less coriaceous, usually blackish; excipulum connate with the epidermis of the host, at first continuous, then splitting above in a stellate manner, or by a long fissure, and exposing the disc.

#### Fam. II. Stictaeae.

Ascophore minute, immersed in the matrix, urceolate then expanding; excipulum very thin and whitish, or almost obsolete; closed at first then opening and margined by the delicate excipulum or by the matrix only; disc waxy, clear-coloured, pale.

B. *Ascophore minute, subcoriaceous, becoming discoid; usually blackish.*

#### Fam. III. Patellarieae.

Ascophore minute, erumpent when quite young, soon becoming superficial and often discoid, sessile, glabrous, subcoriaceous or horny, often blackish.

C. *Erumpent, becoming superficial, often caespitose; corky, coriaceous, or gelatinous.*

Fam. IV. **Dermateae.**

Ascophore small, erumpent, corky, coriaceous, or horny, externally scurfy; mostly caespitose from a common stroma; colour dingy.

Fam. V. **Bulgarieae.**

Ascophore subsessile or sessile, gelatinous when moist, horny when dry, turbinate or discoid; often bright-coloured.

D. *Ascophore superficial (except the genus Pseudopeziza, which is erumpent), fleshy, waxy, or rarely somewhat gelatinous.*

Fam. VI. **Ascoboleae.**

Ascophore minute, sessile, fleshy; asci projecting above the surface of the disc at maturity. The majority grow on dung.

Fam. VII. **Pezizae.**

Ascophore cup-shaped or discoid, often stipitate—fleshy or waxy; asci not projecting above the level of the disc at maturity; often bright-coloured.

Fam. VIII. **Helvelleae.**

Ascophore stipitate, pileate, mitrate, or clavate, hymenium external and exposed from the first; substance between fleshy and waxy, rarely gelatinous.

Fam. I. **PHACIDIEAE.**

In the present group the ascophore is invariably minute, blackish, coriaceous, and either innate or completely immersed in the substratum. When more or less circular in outline, the disc is usually exposed by the excipulum splitting in a stellate manner from the centre into several pointed

teeth, which remain as a border surrounding the disc; when the ascophore is elongated, dehiscence takes place by a slit running its entire length, in both cases the disc is quite exposed when moist, by the gaping of the lips, and in this respect differ from the *Hysteriaceae*, where the usually rigid, carbonaceous lips of the excipulum remain almost closed at maturity.

In the majority of species the ascophores are scattered, but in *Rhytisma* and one or two other genera they are gregarious on an effused, black stroma.

The species mostly occur on leaves or the stems of herbaceous plants; a few, as *Schizothyrium* and *Rhytisma*, are parasites, but the majority are saprophytes.

### ANALYSIS OF THE GENERA.

#### A. *Ascophores scattered, splitting above in a radiate manner.*

**Keithia.** Spores brown.

**Coccomyces.** Spores arranged in a parallel fascicle in the ascus, needle-shaped.

**Coccophacidium.** Spores arranged in a parallel fascicle in the ascus, narrowly fusiform, the widest part above the middle of the spore.

**Schizothyrium.** Spores elliptical, 1-septate.

**Phacidium.** Spores narrowly elliptical, 2-seriate; hypothecium pale, thin.

**Trochila.** Spores narrowly elliptical, 2-seriate; hypothecium firm, blackish.

#### B. *Ascophores scattered, elongated, opening by a long, gaping slit.*

**Colpoma.** Spores long and slender; arranged in a parallel fascicle in the ascus.

**Xylographa.** Spores elliptical, continuous, 2-seriate.

**Pseudographis.** Spores muriform.

C. *Ascophores* scattered, flask-shaped, buried in the matrix and furnished with an elongated neck.

**Ostropa.** Spores needle-shaped, arranged in a parallel fascicle in the ascus; neck of ascophore straight, opening by a long slit.

**Robergea.** Spores needle-shaped, arranged in a parallel fascicle in the ascus; ascophore horizontal, neck becoming vertical.

**Laqueria.** Spores elliptical, 2-seriate.

D. *Ascophores* scattered, spherical then expanding and exposing a circular, dingy disc; spores long and slender, arranged in a parallel fascicle.

### Schizoxylon.

E. *Ascophores* gregarious on a black, effused stroma.

**Rhytisma.** Spores needle-shaped, arranged in a parallel fascicle in the ascus.

**Cryptomyces.** Spores broadly elliptical.  
Growing on woody plants (*Salix*).

**Ephelina.** Spores narrowly elliptical.  
Growing on herbaceous plants (*Rhinanthus*).

### KEITHIA. Sacc. (figs. 1-4, p. 12.)

Ascophore erumpent, innate, splitting above into a few irregular teeth and exposing the disc; asci tetrasporous; spores brown, divided by a transverse septum into two cells of very unequal size; paraphyses present.

*Keithia*, Sacc., Syll. Suppl., vol. x. p. 49.

*Phacidium*, Phillips, Gard. Chron., 1880.

Separated from *Phacidium* by Saccardo, on account of the 4-spored asci, and the brown, 2-celled spores.

**Keithia tetraspora.** Sacc., Syll. Suppl., x. p. 49.  
(figs. 1-4, p. 12.)

Ascophore epiphyllous, innate, erumpent, circular or oblong, up to 1 mm. long, convex, greyish, surrounded by a

yellowish discoloration of the tissues of the host, splitting irregularly above into a few teeth; disc black at the surface, yellowish-brown inside; cells of hypothecium elongated, interwoven; asci cylindrical in the spore-bearing portion, tapering below to a narrow base; spores 4, broadly elliptical, ends usually blunt and rounded, sometimes one or both rather acute or papillate, divided by a transverse septum into two cells of very unequal size, the smaller cell sometimes basal, sometimes apical, clear brown at maturity,  $25-30 \times 15-17 \mu$ ; paraphyses numerous, about  $2 \mu$  thick, septate, expanding into a large pyriform, brown apex,  $5-6 \mu$  wide.

*Phacidium tetrasporum*, Phillips & Keith, Gard. Chron., 1880, Sept. 4, fig. 56; Phil., Brit. Disc., p. 388.

On the upper surface of living leaves of juniper.

Generally one, rarely two specimens on a leaf; resembling a *Puccinia* in habit. The smaller of the two cells of the spore, which is very minute, is sometimes at the base of the spore, in others at the apex, both these conditions are not unfrequently present in the same ascus. In some spores the transverse septum is very difficult to see, and sometimes it is entirely absent.

Specimen from Phillips examined.

#### COCCOMYCES De Notaris. (figs. 10-13, p. 12.)

Ascophores scattered, innate, between fleshy and waxy, blackish or brownish, hemispherico-depressed, shield-like, rather tumid when moist, angularly orbicular, closed above at first, the epidermis of the host usually connate with the excipulum, at length splitting in a radiate manner from the centre into a variable number of teeth, and exposing the disc; asci clavate or cylindric-clavate, 8-spored; spores needle-shaped, hyaline, smooth, continuous, or transversely septate, or multi-guttulate, arranged in a parallel fascicle in the upper portion of the ascus; paraphyses delicate, hyaline, often curved at the apex.

*Coccomyces*, De Not., Giorn. Bot. Ital., vol. ii. p. 38; Sacc., Syll., viii. p. 744; Rehm, Krypt.-Flor., Disc., p. 76.

Closely allied to *Phacidium*, but known by the long, needle-shaped spores, which are arranged in a parallel bundle in the ascus, and are often septate.

**Coccomyces coronatus.** Sacc., Syll., viii. n. 3052; Rehm, Krypt.-Fl., p. 76.

Gregarious or sometimes crowded, innate then emergent, orbicular, or somewhat elongated, about 1-3 mm. across, black, shining, smooth, convex when moist, collapsing and wrinkled when dry, splitting from the centre into 5-10 nearly equal teeth, disc yellowish or pallid; asci clavate, apex narrowed and subtruncate, attenuated downwards into a long pedicel; spores 8, needle-shaped, sometimes very slightly inclining to become clavate, hyaline, at first continuous and multi-guttulate, then becoming many septate,  $40-75 \times 2-3.5 \mu$ , arranged in a parallel fascicle in the wide upper part of the ascus; paraphyses numerous, cylindrical, about  $3 \mu$  thick, adhering to each other, more or less wavy or curled at the apex.

*Phacidium coronatum*, Fries, Obs. Myc., i. p. 167; Phil., Brit. Disc., p. 394.

There is a difference of opinion as to the supposed spermogonia of this species; according to Phillips they are as follows;—Spermogonia intermixed, punctiform, globose-depressed, unilocular, filled with spermatia, which are elongated, straight, colourless, about  $65 \mu$  long.

Karsten, in *Hedwigia*, 1884, no. 2, p. 5, considers *Fusicoccum coronatus* as belonging to the present species; spermatia cylindrical, hyaline, continuous,  $12-14 \times 2-2.5 \mu$ .

Finally Tulasne, Sel. Fung. Carp., iii. p. 135, says the spermatia are linear, straight, unequal in length, averaging about  $6.5 \mu$  long.

On fallen leaves of oak, poplar, willow, chestnut, horn-bean, &c.

**Coccomyces striatus.** Mass. (figs. 10-13, p. 12.)

Ascophore broadly elliptical or orbicular, up to 1 mm. long, blackish, radially rugosely wrinkled or striate, depressed, splitting from the centre into 5-7 irregular teeth and exposing the nearly plane smoky grey disc; excipulum parenchymatous, cells small, external ones olive; cells of hypothecium very small and compact; asci clavate, apex rather acute, attenuated downwards into a long slender pedicel; spores 8, arranged in a parallel fascicle near the apex of the ascus, hyaline, for a long time continuous, then

becoming 1-septate, narrowly lanceolate or narrowly cylindric-fusiform, sometimes slightly curved,  $25-35 \times 3 \mu$ ; paraphyses numerous, filiform, about  $2 \mu$  thick; apex usually curved, slightly or not at all thickened, longer than the asci.

*Phacidium striatum*. Phil. & Plow., Grev., vol. xiii. p. 75; Phil., Brit. Disc., p. 392, pl. xii. f. 76; Sacc., Syll., n. 2932.

On dead stems of *Rubus*.

Resembling externally *P. rugosum*, Fries, but with totally different sporidia. (Phil.)

Authentic specimen from Plowright examined.

***Coccomyces dentatus***. Sacc., Mich., i. p. 59; Rehm, Krypt.-Flora, Disc., p. 78.

Gregarious on pallid spots, orbicular or irregularly quadrangular, the centre depressed, up to 1 mm. across, shining black, at length splitting into 3-5 acute teeth and exposing dingy yellow disc; asci cylindric-clavate, apex somewhat narrowed, attenuated downwards into a long slender pedicel, 8-spored; spores arranged in a parallel fascicle in the upper, wide part of the ascus, hyaline, needle-shaped, curved, at first continuous then becoming more than 1-celled,  $50-70 \times 1.5-2 \mu$ ; paraphyses slender, widening gradually upwards to about  $3 \mu$  thick, only slightly wavy, hyaline.

*Phacidium dentatum*, Kze. & Schmidt, Myc., IIeft i. p. 41; Phil., Brit. Disc., p. 303.

On fallen leaves of oak and sweet chestnut.

Specimens in Fuckel's Fung. Rhen., 1090, and Berk., Brit. Fungi, n. 93, examined.

***Coccomyces rubi***. Karsten, Myc. Fen., ii. p. 578; Rehm, Krypt.-Flora, Disc., p. 81; Sacc., Syll., viii. n. 3078.

Gregarious, somewhat superficial, irregularly circular, convex, blackish, then splitting into irregular teeth which remain as a torn margin, and exposing the pale disc, about 2 mm. across; excipulum and torn margin parenchymatous, cells small, olive-green, asci clavate, apex rather acute, narrowed below into a long, slender pedicel, 8-spored; spores arranged in a parallel fascicle in the wide, upper part of the ascus, hyaline cylindric-fusiform, generally slightly



curved, multi-guttulate,  $45-55 \times 4 \mu$ ; paraphyses slender, hyaline, numerous, apex not thickened but circinate or variously curled.

*Phacidium rubi*, Fries, Syst. Myc., ii. p. 578; Phil., Brit. Disc., p. 394.

On dead leaves of various species of *Rubus*, especially *R. idaeus*.

Specimen in Fries, Scler., Suec., n. 56, examined; also a British specimen in Herb. Berk., Kew.

### COCCOPHACIDIUM. Rehm. (figs. 7-10, p. 91.)

Ascophore globoso-depressed, at first buried in the substratum, then erumpent, splitting above in an irregularly stellate manner, and remaining as an irregular border encircling the circular disc; membranaceo-carbonaceous, black; asci clavate, apex broad with a central somewhat narrowed prominence, 8-spored; spores elongated and slender, clavately fusiform, straight or slightly curved, hyaline, multi-septate, arranged in a parallel fascicle in the ascus; paraphyses slender, septate, apex thickened and brownish.

*Coccophacidium*, Rehm, Krypt.-Flora, Disc., p. 99, figs. 1-5, p. 89.

*Phacidium*, of most authors.

Distinguished by the form of the many-septate, colourless spores, which are narrowly fusiform, but the widest part of the spore is above its middle, hence there is a tendency to become clavate, but both ends are pointed.

*Coccophacidium pini*. Rehm, Krypt.-Flora, Disc., p. 98, figs. 1-5, p. 89. (figs. 7-10, p. 91.)

Ascophores scattered or gregarious, erumpent, roundish, hemispherical but depressed, at first closed and shining black, then splitting into 4-6 obtuse teeth, and exposing the brownish disc, 1.5-3 mm. across; asci clavate, narrowed below into a long, slender pedicel, 8-spored; spores arranged in a parallel fascicle, elongated, curved, narrowly fusiform, both ends pointed, the lower half of the spore narrower than the upper half, at first continuous, then with many large gut-

tulae, finally 3-7-11-septate, hyaline then yellowish,  $65-80 \times 4 \mu$ ; paraphyses slender, about  $2 \mu$  thick; apex nodulose, septate brownish, up to  $6 \mu$  thick, agglutinated.

*Xyloma pini*, Alb. & Schw., Comp. Fung. Uisk., p. 60, t. 5, f. 8.

*Phacidium pini*, Fries, Syst. Myc., ii. p. 573; Phil., Brit. Fung., p. 392.

On bark of Scotch fir.

Specimen examined from Fuckel's Fung. Rhen., n. 1095.

There is a difference of opinion as to the spermogonia form of this species. Phillips describes it as follows: "Spermogonia intermixed with the above [ascigerous form], punctiform, black, acutely umbonate; cavity simple, sinuous, narrow; spermatia filiform, slightly bent, about  $10 \times 1 \mu$ ." This agrees with the description of the spermatia as given by Tulasne, Sel. Fung. Carp., iii. p. 136.

*Coccomyces quadratus*. Karst., Myc. Fenn., i. p. 255; Rehm, Krypt.-Fl., Disc., p. 79.

Gregarious, somewhat innate, almost plane, shining black, then splitting into several acute teeth and exposing the pale, yellowish disc, 1-2 mm. across; asci clavate, stipitate, narrowed above, 8-spored; spores needle-shaped, ends pointed, straight or slightly curved, hyaline, at first continuous, then with a varying number of septa,  $60-80 \times 2-3 \mu$ , arranged in a parallel fascicle, paraphyses slender, almost cylindrical, up to  $3 \mu$  thick, straight, colourless.

*Phacidium quadratum*, Sch. & Kze., Myc., Heft i. p. 32.

*Phacidium leptidium*, Fries, Syst. Myc., ii. p. 576; Phil., Brit. Disc., p. 395.

On dry stems of *Vaccinium myrtillus*.

Specimens in Rehm's Ascom., n. 821, and Moug. and Nestl., Stirp. Vosg., n. 984, examined.

## SCHIZOTHYRIUM. Desm. (figs. 21-23, p. 22.)

Ascophore simple, minute, black, subsuperficial, somewhat between fleshy and carbonaceous, depressed or slightly convex, dehiscing by a longitudinal slit or by 3-4 slits radiating from the centre; asci clavate; spores normally 8, often fewer, elongated, hyaline, 1-septate; paraphyses present.

## SCHIZOTHYRIUM.

*Schizothyrium*, Desmaz; Ann. Sci. Nat., Ser. iii. vol. xi. (1849), p. 360; Rehm, in Krypt.-Flor., Hyst., p. 75; Sacc., Syll., ii. p. 723 (defined by mistake as having the spores continuous).

The present genus holds an intermediate position between the *Hysteriaceae* and the *Phacidiaceae*, leaning towards the former in general habit, and towards the latter in the somewhat fleshy ascophore, which is not so carbonaceous and rigid as in typical members of the *Hysteriaceae*.

**Schizothyrium ptarmicae.** Desm., Ann. Sci. Nat., Ser. iii. vol. xi. p. 361; Rehm, Krypt.-Fl., Hyster., p. 75, figs. 1-5, p. 63; Sacc., Syll., ii. n. 5559.

Gregarious, innate, black,  $\frac{1}{4}$ - $\frac{1}{3}$  mm. across, circular or elliptical, rather soft when moist, cells of excipulum small, very compact, external ones blackish-olive, dehiscing by an elongated or stellately radiating slit; asci cylindric-clavate, most frequently containing only 2 spores; spores elliptic-oblong, or very slightly clavate, straight or very slightly curved, smooth, ends obtuse, hyaline, 1-septate at maturity,  $10-14 \times 5-6 \mu$ ; paraphyses filiform, slender, septate, slightly thickened, branched, and coloured above.

*Labrella ptarmicae*, Desm., Crypt. Fr., exs. n. 189.

On living leaves of *Achillea ptarmica*, forming very minute black spots.

Spermogonia. Perithecia almost plane, shield-like, circular or very broadly elliptical,  $300 \mu$  diam., not provided with a pore for dehiscence, consisting of sinuous, brownish cells forming a pseudo-parenchyma; sporidia ovate-oblong,  $10 \times 6-7 \mu$ ; contents cloudy, sometimes indistinctly divided into two portions, hyaline, supported on short, cylindrical basidia.

*Labrella ptarmicae*, Desm., exs. n. 149 (in part).

*Leptothyrium ptarmicae* (Desm.) Sacc., Mich., ii. p. 114; Sacc., Syll., iii. n. 3379.

On stems of *Achillea ptarmica*.

**Schizothyrium aquilinum.** Rehm, Krypt.-Flor., Hyst., p. 75.

Gregarious, covered at first by the adherent epidermis rounded or elongated, deformed and rugulose, black, opaque

$\frac{1}{2}$ –1 mm. long, dehiscing by a longitudinal slit: asci clavate, apex obtuse, 8-spored; spores irregularly biserial, elliptic-oblong, ends rather obtuse, straight or very slightly curved, hyaline, 1-septate, smooth,  $8\text{--}9 \times 2\cdot5\text{--}3\ \mu$ ; paraphyses slender, more or less branched,  $3\ \mu$  thick above, colourless.

*Sphaeria aquilina*, Fries, Syst. Myc., ii. p. 523.

*Hysterium aquilinum*, Schum., Saell., ii. 158.

*Hypoderma aquilinum* (Schum.), Sacc., Syll., ii. n. 5802.

On dead fronds and rachis of bracken (*Pteris aquilina*).

Appearing to the naked eye as minute, black, roundish or elongated points.

### PHACIDIUM. Fries. (fig. 21, p. 12.)

Ascophores scattered, at first buried completely in the substratum, or only innate, depressed-globose, peltate; excipulum blackish, minutely parenchymatous, firm, usually connate with the epidermis of the host and continuous at first, then splitting from the centre in a radiate manner into a number of more or less acute teeth, and exposing the disc; asci clavate, apex usually narrowed, 8-spored; spores hyaline, continuous, smooth, longish and narrowly elliptical or fusiform, 2-seriate rarely 1-seriate; paraphyses slender, colourless; hypothecium pale.

*Phacidium*, Fries, Obs. Myc., i. p. 161; Phil., Brit. Disc., p. 387; Rehm, Krypt.-Flora, Disc., p. 66; Sacc., Syll., viii. p. 709.

Allied to *Coccomyces*, but distinguished by the shorter spores being irregularly 2-seriate, or rarely 1-seriate, but never arranged in a parallel bundle or fascicle in the upper, wide part of the ascus.

***Phacidium multivalve*.** Kze. & Schmidt, Mycol., Heft i., p. 42; Sacc., Syll., n. 2904.

Gregarious, subinnate, 1–2 mm. across, blackish, splitting above into 4–6 teeth, disc pale; asci clavate, apex somewhat truncate; spores 8, narrowly elliptic-fusiform, straight, continuous, usually 2-guttulate, hyaline,  $9\text{--}10 \times 3\text{--}4\ \mu$ , biserial; paraphyses cylindrical, about  $2\cdot5\ \mu$  thick, colourless.

*Phacidium ilicis*, Phil., Brit. Disc., p. 390. Stylospores. Stroma, containing 3–5 cells, orbicular, plane, black, shining,

splitting above into 3-5 teeth; stylospores straight, continuous, colourless,  $12-13 \times 3 \mu$ .

*Ceuthospora phacidiioides*, Grev., Scot. Crypt. Fl., pl. 253.

*Cryptosphaeria bifrons*, Grev., Flor. Edinb., p. 361.

*Sphaeria bifrons*, Sow., Engl. Fung., t. 316.

On the upper surface of dead holly leaves.

**Phacidium vaccinii.** Fries, Syst. Myc., ii. p. 575; Phil., Brit. Disc., p. 389; Sacc., Syll., n. 2902.

Scattered; erumpent, about  $\frac{1}{4}$  mm. across, convex, black, shining, rugulose, splitting from the centre into usually four teeth, disc sooty black; asci broadly clavate; spores 8, irregularly biseriate, elliptic-fusiform, straight, continuous, hyaline,  $10 \times 2.5-3.5 \mu$ ; paraphyses filiform, about  $1.5 \mu$  thick.

*Xyloma erumpens*, Fries, Obs., i. p. 202.

Spermogonia. Spermata cylindrical, ends truncate, straight, continuous, colourless,  $10-13 \times 2-2.5 \mu$ , produced in minute, blackish conceptacles.

*Dothidea latitans*, Fries, Syst. Myc., ii. p. 552.

*Phyllachora latitans*, Sacc., Syll., iii. p. 60.

*Dothiorella latitans*, Sacc., Syll., iii. p. 241.

*Dothiopsis latitans*, Karst., Hedw., 1884, p. 20.

On leaves of *Vaccinium vitis Idaea*.

**Phacidium abietinum.** Kze. & Schmitt, Mycol., Heft 1, p. 35; Phil., Brit. Disc., p. 392; Sacc., Syll., n. 2925.

Gregarious, erumpent, blackish-grey, more or less orbicular, convex then depressed,  $\frac{1}{2}-1\frac{1}{2}$  mm. across, splitting above into 3-4 blunt teeth; disc grey; asci clavate, apex rather truncate; spores 8, irregularly biseriate, elliptic-fusiform, straight, hyaline, continuous,  $9-13 \times 3.5-4.5 \mu$ ; paraphyses cylindrical, about  $2.5 \mu$  thick, colourless.

On the under-side of fallen pine leaves.

Allied to *P. infestans*, from which the present is distinguished more especially by its much smaller spores.

**Phacidium infestans.** Karsten, Symb. Myc. Fenn., xix. p. 87; Sacc., Syll., n. 2924. (fig. 21, p. 12.)

Subgregarious, more or less circular in outline, 1 mm. across, at first covered by the epidermis, blackish, splitting from the centre into irregular teeth; disc pale; asci broadly

clavate, not much elongated below the spore-bearing portion; spores 8, irregularly biseriate, elliptic-fusoid, straight or curved, often slightly unaequilateral, eguttulate, hyaline, continuous,  $22-35 \times 7-10 \mu$ ; paraphyses numerous, filiform, about  $1 \mu$  thick.

On leaves of *Pinus sylvestris*.

This fungus proves very injurious to the Scotch fir in Finland. So far as I am aware, it is very rare in this country; readily known by the very large spores, which are somewhat variable in shape.

Specimen examined from Roumeguere's Fung. Sel., exs., n. 4331, the specimens being furnished by Karsten.

**Phacidium terrestre.** Phil., Grev., xviii. p. 86.

Gregarious, turbinate then discoid with a short stem-like base, 2-3 mm. across, excipulum parenchymatous, brown, finally splitting from the centre into irregular teeth that remain as a border, and exposing the clear but pale primrose-yellow disc; asci clavate narrowed downwards into a slender pedicel, 8-spored; spores irregularly 2-seriate above, 1-seriate below, elliptic-oblong, ends obtuse, hyaline, continuous, sometimes guttulate, smooth,  $11-13 \times 4-5 \mu$ ; paraphyses slender, the length of the asci, curved and often branched at the tip.

*Podophacidium terrestre*, Niessl, Forh. Nat., Band x. (1871), p. 213, t. v., fig. 50.

On damp ground among decaying leaves, &c.

**Var. humigenum.** Ascophore about 3 mm. across, spores  $25-28 \times 6-7 \mu$ ; paraphyses longer than the asci, otherwise as in the type.

*Phacidium humigenum*, Cke. & Mass., Grev., vol. xvi. p. 78.

On damp decaying twigs and leaves lying on the ground.

**Phacidium phacidioides.** Mass.

Somewhat gregarious, innate, breaking the epidermis into 4-5 somewhat equal acute teeth and exposing the disc, which is pale brown when fresh, but becomes darker when dry, up to  $\frac{1}{2}$  mm. across; asci clavate, with an elongated, narrow pedicel, 8-spored; spores narrowly cylindric-fusoid, continuous, hyaline, smooth, straight or slightly curved,  $18-25 \times 4-5 \mu$ , usually 2-guttulate, biseriate; paraphyses

slender,  $1.5-2\ \mu$  thick, apex slightly clavate or irregularly thickened, up to  $3-5\ \mu$  thick, brownish, agglutinated together.

*Stictis phacidioides*, Fries, Syst. Myc., ii. p. 198.

*Trochila phacidioides*, Karst., Disp. Syst. Myc., p. 249.

*Phacidium acrostaphyli*, Karst., Symb. Myc., p. 256; Phil., Brit. Disc., p. 391; Sacc., Syll., n. 2909.

On dry leaves of *Acrostaphylos uva-ursi*.

Specimens examined from Fries, Scler., Suec., n. 277, and Karst., Fung. Fenn., n. 843.

***Phacidium minutissimum.*** Auersw., in Rab., Fung. Eur., n. 228; Phil., Brit. Disc., p. 389; Sacc., Syll., viii. n. 2915.

Gregarious on whitish spots, or often densely gregarious over the entire under surface of the leaf, at first closed and brown, innate, irregularly circular, finally the yellowish-white disc is exposed by the rupture of the epidermis into 3-4 teeth, up to  $\frac{1}{4}$  mm. across; asci elliptic-clavate, 8-spored; spores irregularly 2-seriate, oblong-fusoid, continuous, hyaline, smooth,  $7-8 \times 3-4\ \mu$ ; paraphyses slender, apex rather abruptly capitate and up to  $5\ \mu$  across, colourless.

*Naevia minutissima*, Rehm, Krypt.-Flora, Disc., p. 138.

On the under side of dry, fallen oak leaves.

Specimen in Rab., Fung. Eur., n. 228, examined.

Ascospore, very minute, gregarious or sometimes crowded; often covering the entire under surface of the leaf. According to Rehm, the apex of the ascus becomes violet with iodine.

***Phacidium seriatum.*** Mass.

Densely gregarious, often arranged in series, circular or broadly elliptical, plane or slightly concave, the epidermis being eventually torn and exposing the disc,  $\frac{1}{6}-\frac{1}{4}$  mm. across; asci cylindric-clavate, apex narrowed, 8-spored; spores irregularly 2-seriate, cylindric-oblong, ends obtuse, straight, hyaline, smooth, for some time continuous and 2-guttulate, finally becoming 1-septate,  $7-9 \times 3\ \mu$ ; paraphyses hyaline, slender, slightly incrassated at the base, apex not at all thickened.

*Stictis seriata*, Lib., Crypt. Ard., Fasc. iii. (1834), n. 233



(not Phil., Disc., p. 385, if the measurement of the asci given there are correct.

*Naevia seriata*. Fekl., Symb. Myc., p. 249; Sacc., Syll., viii. n. 2723; Rehm., Kr.-Flora, Disc., p. 147.

The above description accords with specimens in Madam Libert's Plant. Crypt. Ard., Fasc. iii. n. 233; Phil., Elv. Brit., n. 100; and Fuckel, Fung. Rhen., n. 1841.

On the under side of dry leaves of *Carex hirta*, and *C. ampullacea*.

Conidial stage. Conidia globose, hyaline, about  $3\ \mu$  diameter, arranged in chains of 6-8 conidia, and not readily breaking up. These moniliform chains are densely packed side by side, and form patches indistinguishable from the ascigerous forms under a pocket lens. The two stages are mixed, in the specimens in Fuckel's Fung. Rehn., n. 1841, and in all probability Fuckel mistook the chains of conidia for spores in an ascus, as he describes what he considered to be the ascigerous condition, as, "asci linear, sporidia 6-8, globose, minute, hyaline."

**Phacidium clematidis.** Phil., Grev., xvii. p. 46.

Scattered or gregarious, erumpent, orbicular, minute, splitting the epidermis into unequal laciniae; hymenium pallid brown; asci clavate or clavate-fusiform; spores 8, linear-acute, 5-6-guttulate, straight,  $35 \times 4\ \mu$ ; paraphyses slenderly filiform.

On dead branches of *Clematis*. Autumn.

The cups are  $\frac{1}{8}$ - $\frac{1}{4}$  of a line broad; asci  $55-56 \times 10\ \mu$ . The margin is cut into short, unequal laciniae, or sometimes only coarsely serrate.

No specimen seen.

**TROCHILA.** Fries. (figs. 39-44, p. 12.)

Ascophore innate, thin, somewhat coriaceous, covered at first by the epidermis which is at length either ruptured irregularly or splits in a circumscissile manner; asci elongate; spores 8, 2-seriate, continuous, hyaline; paraphyses present; hypothecium firm, blackish.

*Trochila*, Fries, Summa Veg. Scand., p. 367; Phil., Brit. Disc., p. 396; Sacc., Syll., v. 8, p. 728.

*Stegia*, Fries, Obs. ii. p. 352; Phil., Brit. Disc., p. 398; Sacc., Syll., 8, p. 733.

I have followed Crouan (Flor. Finist., p. 44), in uniting *Stegia* with *Trochila*. The species in both genera are developed beneath the epidermis, and the distinction between the two depended mainly on the way in which the fungus burst through—tearing the epidermis irregularly in *Trochila*, and lifting it up in an entire piece in *Stegia*.

***Trochila craterium*.** Fries, Summa. Veg. Scand., p. 367; Phil., Brit. Disc., p. 396, pl. 12, f. 77; Sacc., Syll., n. 2988. (figs. 39–41, p. 12.)

Ascophore blackish, about  $\frac{1}{3}$  mm. across, becoming much collapsed, opening by an irregularly toothed orifice; asci cylindrical, base attenuated, spores 8, irregularly biseriate, broadly elliptical, ends obtuse, smooth, hyaline,  $7-9 \times 4-5 \mu$ ; paraphyses cylindrical, septate, apex clavate, tinged olive, rather stout.

Gregarious. On the underside of dry ivy leaves.

*Pycnidia*. Conidia colourless, continuous  $8 \times 5-6 \mu$ , borne on colourless, cylindrical basidia.  $12-15 \times 6 \mu$ . (= *Myxosporium paradoxum*, Fekl.)

***Trochila laurocerasi*,** Fries, Summa, Veg. Scand., ii. p. 367; Phil., Brit. Disc., p. 397; Sacc., Syll., n. 2989.

Ascophore orbicular, blackish, up to 1 mm. across, collapsing, epidermis splitting into 3–4 acute teeth; asci cylindric-clavate, spores 8, irregularly biseriate, smooth, hyaline, elliptic-oblong, ends rounded,  $7-12 \times 4-5 \mu$ ; paraphyses slender, septate.

Gregarious, on the under side of fallen leaves of cherry laurel. Phillips says the disc is yellowish when moist.

***Trochila buxi*.** Capron, in Cke., Hdbk., p. 768; Phil., Brit. Disc., p. 397; Sacc., Syll., n. 2991.

Ascophore minute, not more than  $\frac{1}{3}$  mm. across, very slightly raising the epidermis, which becomes ruptured into a minute toothed pore; asci narrowly clavate, spores 8, irregularly biseriate, elliptical, ends rather acute, hyaline, smooth,  $11-14 \times 5 \mu$ ; paraphyses not seen.

On the underside, fading or dead, of box leaves.

Gregarious, very minute, the rupture of the epidermis reduced to a minute ragged pore. Spores larger than in any other British species. Drawn up from type in Herb. Kew.

**Trochila ilicis.** Crouan, Flor. Finist., p. 44. (figs. 42-44, p. 12.)

Ascophore formed below the epidermis, blackish with a pale ring-like margin, circular or irregular and slightly depressed, the epidermis finally falling away in a single piece.  $\frac{1}{2}$ -1 mm. diam.; asci cylindric-clavate, base narrowed, spores 8, elliptical, ends obtuse, irregularly biseriate, smooth, colourless, continuous,  $9-12 \times 3.5-4.5 \mu$ , paraphyses slightly longer than the asci, cylindrical, apex slightly clavate.

*Stegia ilicis*, Fries, Obs. Myc., ii. p. 352; Phil., Brit. Disc., p. 398, pl. 12, f. 78; Sacc., Syll., n. 3007.

On fallen holly leaves, most frequently on the upper surface. Densely gregarious.

**COLPOMA.** Wallr. (figs. 59-62, p. 12, and f. 51, p. 22.)

Ascophore developing in the matrix, then erumpent, elongated, narrow, dehiscing by a slit running the entire length of the ascophore, gaping and exposing the whole of the disc; blackish, soft and coriaceous; asci clavate, rather narrowed at the apex, mostly narrowed downwards into a slender pedicel, 8-spored; spores very long and slender, continuous or many-septate, hyaline, arranged in a parallel fascicle; paraphyses slender, usually wavy at the apex.

*Colpoma*, Wallroth, Crypt., ii. p. 422; Cke., Hdbk., p. 765; Sacc., Syll., ii. p. 803.

*Clithris*, Rehm, Krypt.-Flor., Disc., p. 101.

Distinguished by the narrow, elongated, wavy ascophores. Previously included in the Hysteriaceae, from which it has been removed on account of the widely exposed disc.

**Colpoma quercinum.** Wallr., Flor. Crypt. Germ., ii. p. 423; Cke., Hdbk., p. 765, fig. 361; Sacc., Syll., ii. n. 5851. (figs. 59-62, p. 12.)

Gregarious, elongated, usually developing transversely to the long axis of the branch on which it is growing; origi-

nating below the bark and appearing at first as a long, straight, or curved, convex ridge, then rupturing the bark, which forms two irregularly torn, spurious lips; black at first, then gradually opening by an elongated slit, the lips often pale in colour; lips at length widely open, exposing the pallid disc; up to 1.5 cm. long by 1.5–2 mm. wide, straight or curved; asci clavate, apex narrowed, continued downwards into a long, slender pedicel, spores 8, arranged in a parallel fascicle, needle-shaped, as long as the swollen part of the ascus, about  $95 \times 1.5 \mu$ , hyaline, at first multi-guttulate, then multi-septate; paraphyses filiform, equal, about  $1.5\text{--}2 \mu$  thick, colourless, not thickened at the more or less curled apex, longer than the asci.

*Clithris quercina*, Rehm, Krypt.-Flora, Disc., p. 102, figs. 1–5, p. 91.

On small branches and twigs of oak.

Distinguished by the large ascophores growing more or less transversely on the young branches, and looking like gaping cracks when expanded.

**Colpoma degenerans.** Mass. (fig. 51, p. 22.)

Gregarious, erumpent, the ruptured bark forming spurious lips, sessile, roundish then elongated, disc almost plane, blackish-brown or livid, soft,  $1\text{--}3 \times 1$  mm.; asci clavate apex slightly narrowed, base attenuated into a long, slender pedicel, 8-spored; spores filiformly clavate, straight, hyaline, continuous,  $85\text{--}95 \times 2.5 \mu$ , arranged in a parallel fascicle; paraphyses slenderly cylindrical, about  $2 \mu$  thick, colourless.

*Sporomega degenerans*, Corda, Icon. Fung., v. p. 60; Sacc., Syll., ii. n. 5845.

*Hysterium degenerans*, Fries, Syst. Myc., ii. p. 585.

*Clithris degenerans*. Rehm, Krypt.-Flora, Disc., p. 104.

On dead branches of *Vaccinium*.

A variable species, but distinguished by the very slender, elongated, continuous spores, which, from a needle-like base become gradually thickened upwards, increasing about  $3 \mu$  thick at the apex, thus resembling a very long, slender club. Ascophore usually more or less elongated, sometimes roundish, at first bordered with the upraised torn bark, proper margin almost obsolete; disc almost or quite plane,

livid, soon blackish-brown. On small twigs the ascophores are usually elongated in the direction of the long axis of the stem on which they are growing, but on thicker branches they are arranged at all angles.

Specimen from Fries' Scler. Suec, n. 40, examined.

XYLOGRAPHA. Fries. (figs. 42-44, p. 22.)

Ascophore narrow and elongated, imperfectly marginate, waxy; disc widely exposed at maturity, thickish, brownish; asci clavate, 8-spored; spores elliptical, continuous, hyaline, smooth, biseriate; paraphyses present.

*Xylographa*, Fries, Syst. Myc., ii. p. 197; Sacc., Syll., viii. p. 664; Rehm, Krypt.-Flora, Disc., p. 153; Leighton, Lichen-Flora of Great Brit., p. 390.

*Xylographa parallela*. Fries, Syst. Myc., ii. p. 197; Rehm, Krypt.-Flor., Disc., p. 153; Leighton, Lichen-Flora of Gt. Brit., p. 391. (figs. 42-44, p. 22.)

Gregarious, sessile, innate, erumpent, elongated, lying parallel between the fibres of the wood, blackish brown, internally greyish,  $\frac{1}{2}$ -3 mm. long, disc closed at first, then open and plane or slightly convex; asci clavate, apex obtuse, 8-spored; spores elliptical, ends obtuse, straight or very slightly curved, smooth, hyaline, continuous, with 1 large or 2 small guttulae;  $11-16 \times 6-7 \mu$ , irregularly biseriate; paraphyses septate, gradually becoming thicker upwards, apex about  $5 \mu$  thick, brown.

*Opegrapha parallela*, Ach., Lich. Univ., p. 253.

*Stictis (Xylographa) parallela*, Cke., Hdbk., p. 736.

On weathered wood.

Forming minute, black, parallel, straight or slightly curved black streaks, nestling between the fibres of the wood.

*Var. pallens*, Nyl., Lich. Scand., p. 230; Leighton, Lich.-Flora, p. 390.

Ascophore becoming pale.

On old wood.

Specimen examined in Fries' Scler. Suec., n. 95.

## PSEUDOGRAPHIS. Nyl. (figs. 48-50, p. 22.)

Erumpent, rounded or elongated, straight or curved; epithecium rather thick, rugulose, black, splitting into two lips that become widely separated and exposing the disc; asci cylindric-clavate, thick walled; spores 8, elongated, 4-8-celled, and eventually becoming muriform, hyaline or yellowish, paraphyses present.

*Pseudographis*, Nylander, Herb. Mus. Fenn., p. 96; Sacc., Syll., ii. p. 769; Rehm, Krypt.-Flor., Disc., p. 99.

Separated from the *Hysteriaceae* by the lips of the excipulum expanding widely at maturity, and exposing the greater portion of the disc. The substance also is not rigid and carbonaceous when moist, but rather soft and fleshy.

***Pseudographis pinicola*.** Rehm, Ascom., n. 24; Rehm, Krypt.-Flor., Disc., p. 99; Sacc., Syll., ii. n. 5733. (figs. 48-50, p. 22.)

Mostly gregarious, rounded or elliptical, narrowed below or very shortly stipitate; epithecium rather fleshy, rugulose, blackish brown; margin incurved, rather irregularly torn or fimbriate; disc exposed and pallid when moist; 1-2½ mm. long, 1-1½ mm. broad; asci clavate, apex rather narrowed, attenuated below, often curved; spores 8, irregularly biserial, elongated-elliptical, or more or less fusiform, straight or slightly curved, 3-5-7-septate, often guttulate, 25-35 × 7-10 μ, hyaline then yellowish; paraphyses numerous, filiform, equal, branched above and often more or less flexuous, about 2 μ thick, colourless.

*Hysterium pinicola*, Nyl., Pez. Fenn., p. 77.

*Triblidium pinicolum*, Cooke, Grevillea, vol. iv. tab. 67, fig. 8.

On bark of *Pinus sylvestris*.

Specimen from Nylander examined; also specimen in the Kew Herb. copy of Rehm's Ascom., n. 24.

***Pseudographis elatina*.** Nyl., Herb. Mus. Fenn., p. 96; Rehm, Krypt.-Flor., Disc., p. 100; Sacc., Syll., ii. n. 5732.

Gregarious, erumpent, often deformed, curved, externally rugose, black; lips distant when moist, disc large, pallid-

reddish, then reddish black, 1-2 mm. broad; asci cylindrical, apex narrowed; spores 8, quite irregularly biserial, oblong, ends obtuse, straight or very slightly curved, 2-4-8-celled, sometimes becoming muriform, often guttulate,  $20-30 \times 10-14 \mu$ , hyaline then yellowish; paraphyses filiform, about  $2 \mu$  thick, branched above, flexuous.

*Lecanora elatina*, Acharius, Lich. Univ., p. 387; Leighton, Brit. Lichen Flora, p. 223.

On bark of fir, holly, &c.

Distinguished from *P. pinicola* by the reddish disc, and more distinctly by the sporidia having very obtuse ends.

Specimen determined by Nylander examined.

### OSTROPA. Fries.

Ascophore vertically immersed in the bark, rarely penetrating the wood, broadly ovate, terminating upwards in a somewhat prominent papilla that bursts through the bark and dehiscs by an elongated slit, lips thick and obtuse; asci narrowly cylindrical, 8-spored, apex thickened; spores needle-shaped, multi-septate, colourless, almost as long as the ascus, arranged in a parallel fascicle; paraphyses very slender, straight, septate, branched above, colourless.

*Ostropa*, Fries, Syst. Veg. Orb., p. 109; Rehm, Krypt.-Flora, Disc., p. 189; Sacc., Syll., ii. p. 804.

Allied to *Robergea*, but distinguished by the vertical ascophore and the ostiolum being elongated.

*Ostropa cinerea*. Fries, Summa Veg. Scand., p. 401; Rehm, Krypt.-Flora, Disc., p. 188, figs. 1-5, p. 186; Sacc., Syll., ii. n. 4661.

Scattered or gregarious, causing the branch to present a whitish bleached appearance at the parts attacked; ascophore subglobose, base immersed, 1-2 mm. across, furnished at the apex with a papilla that projects through the bark and dehiscs at the apex by a narrow slit about  $\frac{2}{3}$  mm. long, mouth at first hoary, grey, then naked, black, and somewhat shining; asci narrowly cylindrical, straight, 8-spored, apex thickened; spores almost as long as the ascus, straight, arranged in a parallel fascicle, very slenderly needle-shaped,



multi-septate, hyaline,  $150-180 \times 1.5 \mu$ ; paraphyses filiform, about  $1.5 \mu$  thick, septate, branched at the apex, hyaline.

*Hysterium cinereum*, Pers., Syn. Fung., p. 99.

On dry branches of ash, poplar, willow, hazel, &c.

Specimen from Fries examined.

## ROBERGEEA. Desm.

Ascophore immersed in the substratum, somewhat coriaceous, flask-shaped, horizontal, reaching the surface by a more or less vertical, elongated neck, mouth minute, rounded, erumpent; asci narrowly cylindrical, 8-spored, apex thickened; spores needle-shaped, many-septate, hyaline, nearly as long as the ascus, and arranged in a parallel fascicle; paraphyses very slender and very straight, hyaline.

*Robergea*, Desmaz., Crypt. France, exs., ser. i. n. 1526; Desm., Ann. Sci. Nat., ser. iii. 1847, vol. viii. p. 177; Sacc., Syll., ii. p. 806; Rehm, Krypt.-Flora, Disc., p. 189.

Readily distinguished by the flask-shaped ascophore lying horizontally in the substance of the matrix, and reaching the surface by an elongated, ascending, narrow neck.

***Robergea unica.*** Desmaz., Crypt. France, ser. i. n. 1526; Desm., Ann. Sci. Nat., ser. iii. vol. viii. p. 177-179; Sacc., Syll., ii. n. 5861; Rehm, Krypt.-Flora, Disc., p. 190.

Gregarious; ascophore flask-shaped, buried in the wood, horizontal, 2-2.5 mm. long, 1 mm. broad, reaching the surface by means of a more or less vertical, elongated neck, which bursts through the bark, often forming an elongated slit, mouth of neck small, round, whitish, often surrounded by white meal; asci very long, narrowly cylindrical, apex thickened; spores needle-shaped, straight, many-septate, hyaline,  $400-550 \times 1-1.5 \mu$ , arranged in a parallel fascicle; paraphyses filiform, simple, straight, about  $1 \mu$  thick, colourless.

On dry branches of ash, poplar, hazel, &c.

Specimen examined from Desmazière's Crypt. France, exs., ser. i. n. 1526.

## LAQUEARIA. Fries. (figs. 36-38, p. 12.)

Ascophore innate, flask-shaped, base plane, prolonged upwards into a short neck, which pierces the bark, composed of dark-coloured parenchymatous tissue; asci clavate, spores 8, continuous, hyaline (paraphyses absent?)

*Laquearia*, Fries, Summa Veg. Scand., p. 366; Phil., Disc. Brit., p. 372; Sacc., Syll., viii. p. 586.

An imperfectly known genus. I have not seen a British specimen, and have drawn up the characters, generic and specific, from the specimen in Fuckel's Fung. Rhen., exs. n. 2066. I fail to find in the dry specimens that the hypothecium is absent; there appears to be a flask-shaped continuous excipulum perfectly flat at the base owing to being seated on the wood, which is not penetrated, the upper portion elongates into a short thick neck which pierces the bark. When the bark is removed the fungus is carried along with it.

*Laqueria sphaeralis*. Fries, Summa Veg. Scand., p. 366; Phil. Brit. Disc., p. 372, pl. xi. f. 72; Sacc., Syll., n. 2429. (figs. 36-38, p. 12.)

Ascophore flask-shaped, mouth contracted, entire, blackish-brown, about  $\frac{1}{2}$  mm. diameter, asci somewhat clavate, small, spores 8, irregularly biseriate, elliptical, smooth, hyaline,  $4 \times 2 \mu$ ; paraphyses very slender.

On dry ash branches. Gregarious; developed under the bark, which is pierced by the narrowed upper portion of the ascophore.

## SCHIZOXYLON. Persoon. (figs. 24-27, p. 22).

Ascophore subimmersed, spherical at first, apex plane, black, then expanding and exposing the dingy disc; often pale and furfuraceous or pulverulent outside; asci cylindrical; spores 8 filiform, arranged in a parallel fascicle in the ascus, elongated, becoming multi-septate and breaking up into joints at the septa; paraphyses present.

*Schizoxylon*, Persoon, Ann. Wett., i. (1810), p. 11; emended

by Tulasne, Carp., iii. p. 148; Sacc., Syll., viii. p. 697. (Not of Leighton, Fungus-Flora, p. 390).

*Cyclostoma*, Crouan, Fl. Finist., p. 30.

*Schmitzonia*, Phil., Brit. Disc., p. 379.

Distinguished from other genera having very long, filiform, multi-septate spores by the spores readily breaking up into numerous "joints" at the septa, each "joint" being a cell of the compound or many-celled spore; and by the spherical ascophore having a small circular disc.

**Schizoxylon Berkeleyanum.** Fuckel, Symb. Myc., p. 251; Sacc., Syll., n. 2863. (figs. 24–27, p. 22.)

Scattered or gregarious, ascophore .5–1 mm. high and broad, erumpent, then subsuperficial, sessile on a broad base, orbicular at first then expanding and exposing the blackish-olive disc, which is slightly pulverulent at first, margin scarcely projecting, quite entire; externally pale yellowish-green, then greyish or pallid, pulverulent; asci cylindrical, narrowed at the base; spores 8, filiform, very slender, almost as long as the ascus,  $140-150 \times 1.5-2.5 \mu$ , septate, breaking up into cells at the septa,  $6-10 \times 1.5-2 \mu$ , hyaline; paraphyses filiform,  $1.5-2 \mu$  thick, apex branched, olive-brown, longer than the asci.

*Stictis Berkeleyana*, Dr. & Lév., Fl. Alg., t. 89, f. 8.

*Schmitzonia Berkeleyana*, Phil., Brit. Disc., p. 379.

On dead stems of *Artemisia vulgaris*. On the continent and in Algeria this species occurs also on stems and dead branches of *Epilobium*, *Oenothera*, *Genista*, *Lappa*, *Galium*, *Pulicaria*, *Lonicera*, *Rosa*, *Rubus*, *Populus*, and *Vitis*.

Specimen sent by Lévécille to Berkeley examined.

**Schizoxylon sepiolum.** Pers., Ann. Wett., i. 1810, p. 11, t. 10, f. 9; Sacc., Syll., n. 2877.

Ascophore sessile, about  $\frac{3}{4}$  mm. across, subglobose at first, closed, and wart-like, then becoming patellate, indistinctly crenulate at the margin, disc plane, blackish, at first with a grey bloom; blackish-red inside; asci narrowly clavate, attenuated into a slender stipitate base; spores 8, subhyaline, filiform, very slender, multi-septate, nearly as long as the ascus, breaking up into joints at the septa, each joint measuring about  $4 \times 1.5-2 \mu$ ; paraphyses filiform, repeatedly branched in a furcate manner.

On old weathered wood of oak, pine, &c.

Distinguished at once from *S. Berkeleyanum* by the absence of the yellowish furfuraceous exterior.

RHYTISMA. Fries. (figs. 1-3, p. 91).

Ascophores crowded on a thin, broadly effused, black, crust-like stroma; elongated, often more or less wavy, finally gaping and exposing the pale disc; asci clavate, 8-spored; spores elongated, slender, hyaline, continuous, arranged in a parallel fascicle in the ascus; paraphyses slender, often curved at the tip. Conidia usually produced.

*Rhytisma*, Fries, Vet. Akad. Handl. (1819), p. 104; Cke., Hdbk., p. 755; Rehm, Krypt.-Flora, Disc., p. 82; Sacc., Syll., viii. p. 752.

The species commence as parasites on living leaves, forming conspicuous pitch-black patches, often of considerable size. Conidia are formed during the autumn or winter, and ascospores the following spring, after the leaves are partly decayed.

*Rhytisma acerinum*. Fr., Syst. Myc., ii. p. 569; Cke., Hdbk., p. 756; Rehm, Krypt.-Flora, Disc., p. 82; Sacc., Syll., viii. n. 3083.

Stroma forming slightly raised, irregularly circular, black patches on the upper surface of living leaves, 1-2 cm. across; ascophores gregarious on the stroma, elongated, wavy, gaping at maturity and exposing the pale disc; stroma blackish; hypothecium hyaline; excipulum parenchymatous, cells minute, olive-brown; asci clavate, apex narrowed, 8-spored; spores arranged in a parallel fascicle, needle-shaped, apex obtuse, base pointed, hyaline, guttulate, often slightly curved,  $60-80 \times 1.5-2.5 \mu$ ; paraphyses slender, equal, about  $1.5 \mu$  thick, curled or wavy at the apex, hyaline.

*Xyloma acerinum*, Pers., Syn. Fung., p. 104.

Spermogonia. Spermata cylindrical, ends obtuse, straight or curved, hyaline,  $6-9 \times 1$ .

*Melasmia acerinum*, Lév., Ann. Sci. Nat., ser. iii., vol. v., p. 276.

On living leaves of *Acer pseudoplatanus* and *A. campestre*; also on other species of *Acer* in other countries.

The black patches appear on the leaves during summer, and in the autumn spermatia are developed in those same conceptacles that become ascophores and contain asci the following spring, when the leaf is partly decayed and has been lying on the ground throughout the winter.

Specimen in Kew Herbarium, named by Persoon, examined, also specimen in Fries' Scler. Suec., n. 207.

**Rhytisma punctatum.** Fr., Vet. Akad. Handl., 1819, p. 104; Cke., Hdbk., p. 756; Rehm, Krypt.-Flora, Disc., p. 83; Sacc., Syll., viii., n. 3084. (figs. 1-3, p. 91.)

Ascophores gregarious on a roundish, yellow spot on the leaf 1-1.5 cm. across, crowded, rarely more or less confluent, black, circular or elongated and often curved, 1-1½ mm. across; excipulum parenchymatous, cells minute, olive; at length splitting lengthwise or in a radiate manner, and exposing the greyish disc; asci clavate, apex narrowed, 8-spored; spores needle-shaped, apex blunt, base pointed, straight, continuous, guttulate, hyaline, arranged in a straight, parallel fascicle, 35-40 × 1.5-2 μ; paraphyses slender, colourless, about 1 μ thick.

*Xyloma punctatum*, Pers., Syn. Meth. Fung., p. 104.

Spermogonia. Spermatia cylindrical, straight, hyaline, 5-6 × 1.5 μ.

On living leaves of *Acer campestre* and *Acer pseudoplatanus*; also on other species of *Acer* in other countries.

The spermatia are formed during the autumn, the asci appearing in the same cavities the following spring on the dead leaves.

Readily distinguished by the stroma being broken up into numerous minute portions, crowded together on a yellowish patch.

Specimens examined: Rehm, Ascom., 366 (ascigerous form); Sydow, Myc. March., n. 351 (Spermogonia).

**Rhytisma salicinum.** Fr., Vet. Akad. Handl., 1819, p. 104; Cke., Hdbk., p. 755, fig. 357; Rehm, Krypt.-Flora, Disc., p. 84, figs. 1-7, p. 65; Sacc., Syll., viii. n. 3085.

Stroma forming circular or irregular thickish, shining

black patches 4-5 mm. thick and  $\frac{1}{2}$ -2 cm. across on the upper surface of the leaves of the host plant, internally white; ascophores roundish or elongated, at length splitting and exposing the yellowish disc; epithecium parenchymatous, cells minute, densely packed, dark olive; asci clavate, apex narrowed, 8-spored; spores needle-shaped, pointed at both ends, curved, continuous, guttulate, hyaline,  $65-95 \times 1.5-2.5 \mu$ ; paraphyses slender, apex wavy, hyaline or with a brown tinge.

*Xyloma salicinum*, Pers., Disp. Meth. Fung., p. 5, t. ii. fig. 4.

*Xyloma umbonatum*, Hoppe, Wahl. Flor. Lapp., p. 324.

Spermogonia. Spermata cylindrical, straight or slightly curved, continuous,  $5-6 \mu$  long.

*Melasmia salicinum*, Lév., Sel. Fung. Corp., iii. p. 119.

On the upper surface of the leaves of various species of willow.

The spermata are produced in the autumn, and the asci appear in the same conceptacles the following spring on the fallen leaves.

Specimens examined from Fries' Scler. Suec., nos. 134 and 208, and Cooke, Fung. Brit., n. 461.

*Rhytisma andromedae*. Fr., Syst., Myc., ii. p. 567; Cke., Hdbk., p. 755; Rehm, Krypt.-Flora, Disc., p. 85; Sacc., Syll., viii., n. 3087.

Stroma externally shining black, forming irregular patches, or frequently covering the entire upper surface of the leaf; internally white, and composed of stout, thick-walled interwoven hyphae; ascophores elongated, often wavy, at length gaping and exposing the pale disc; asci clavate, pointed above, 8-spored, spores long and narrowly clavate, apex obtuse, lower half tapering and pointed, straight or slightly curved, hyaline, continuous, guttulate,  $50-60 \times 5-7 \mu$ , irregularly fasciculate; paraphyses slender, about  $2 \mu$  thick, apex curled, hyaline.

*Xyloma andromedae*, Pers., Syn. Fung., p. 104.

On the upper surface of living leaves of *Andromeda polifolia*.

No secondary form of fruit is known, and the ascospores are matured in spring on the fallen, decaying leaves.



Readily distinguished by the narrowly clavate spores and by the host.

Specimens examined in Scler. Suec., 133, and Rehm, Asc., n. 468.

*Doubtful species.*

**Rhytisma urticae.** Fries, Syst. Myc., ii. p. 570; Cke., Hdbk., p. 756; Rehm, Krypt. Fl., p. 86; Sacc., Syll., n. 3092.

Stroma forming an effused shining black crust of variable form, and often quite encircling the stem, 1-6 cm. long; internally grey, and composed of interwoven hyphae; ascophores gregarious or somewhat scattered, slightly elevated, elongated up to 1.5 mm., splitting and exposing the grey disc; asci clavate, 8-spored; spores irregularly biseriate, cylindrical, both ends rather obtuse, hyaline, continuous, straight or very slightly curved;  $15-30 \times 4-5 \mu$ ; paraphyses slender, hyaline.

*Xyloma urticae*, Wallr., Fl. Crypt. Germ., p. 209.

On decaying nettle stems.

Rehm says in his diagnosis of the present species, "spores 1(-2?) celled." I have not met with septate spores in the specimens contained in any of the exsiccati quoted by him, and I have carefully examined each one. According to Fuckel—Symb. Myc., Suppl. ii., p. 52—the stylospores of the present species are elongated, both ends narrowed, often crooked, continuous,  $24 \times 5-6 \mu$ , and are mature in February and March.

Differs from the typical structure of the genus in the biseriate spores.

Specimen examined from Cooke's Fung., Brit. exs., n. 392.

CRYPTOMYCES. Greville. (figs. 4-6, p. 91.)

Ascophores innate, gregarious, springing from a broadly effused white stroma, depressed, covered with the bark of the host, which remains connate with the black, parenchymatous excipulum, the whole forming broadly extending, blistered or bullate, black, carbonaceous patches, finally



cracking in irregular lines and exposing the disc; asci cylindrical, 8-spored; spores hyaline, continuous, smooth, elliptical, 1-seriate; paraphyses present.

*Cryptomyces*, Greville, Scot. Crypt. Flor., vol. iv. pl. 206; emended by Rehm, Krypt.-Flora, Disc., p. 106; Sacc., Syll., viii. p. 707.

*Rhytisma*, of many authors.

The present species is separated from *Rhytisma* on account of the very different spores and the depressed ascophores being immersed in the substance of a broadly extending, white stroma, formed of very densely and compactly interwoven hyphae.

***Cryptomyces aureus*.** Mass. (figs. 4-6, p. 91.)

Forming blistered patches 1-10 cm. long on living branches, at first blackish-brown with a somewhat broad, yellow margin, then becoming entirely shining black and carbonaceous; superficial portion or excipulum with a dense olive-green, parenchymatous cortex, consisting of minute, polygonal cells; stroma and hypothecium pure white, composed of densely interwoven hyphae; asci cylindrical, base rather abruptly narrowed, apex rounded, 8-spored; spores 1-seriate, continuous, smooth, elliptical or sometimes broadest slightly above the middle, ends rounded, straight, when young furnished with an external thin gelatinous coating, hyaline then with a yellow tinge, contents granular,  $20-25 \times 10-12 \mu$ ; paraphyses slender, septate, apex clavate and tinged brown.

*Sphaeria aurea*, Sow., Eng. Fung., pl. 356.

*Rhytisma maximum*, Fries, Syst. Myc., ii. p. 566; Cke., Hdbk., p. 755; Tulasne, Sel. Fung. Carp., iii. pl. xvi. figs. 9-15.

*Cryptomyces Wauchii*, Grev., Scot. Crypt. Fl., vol. iv. pl. 206.

*Cryptomyces maximus*, Rehm, Krypt.-Flora, Disc., p. 107, figs. 1-5, p. 92; Sacc., Syll., viii. n. 2891.

On living branches of willow. Saccardo says also on *Cornus*.

Readily recognised by the large black blistered patches having a well-defined, usually lobed margin. At maturity the outer stroma separates from the matrix at the margin, becomes revolute, and finally falls away.

Tulasne describes the occurrence of minute, ovate, continuous, hyaline spermatia about  $5 \times \mu$ , borne on slender, hyaline sterigmata, and produced in specialised conceptacles in the stroma. Plowright describes similar bodies, and says they are formed in the ascophores previous to the formation of asci. The last-named author describes—Grev., vol. iv. p. 28, pl. 53, figs. 1-9—what he considers to be other secondary forms of fruit. A *Fusarium* which oozes out upon the surface of the stroma in little pink masses; the spores are curved, obscurely 3-septate at maturity. Secondly, minute perithecia with a minute, black, shining ostiole, seated on the stroma, and containing oblong, smooth, usually 3-septate, brown spores; the spores have occasionally 4 transverse and 1 vertical septum.

Specimens examined from Cooke, Fung. Brit., exs., n. 670; and Fries, Scler. Suec., n. 250; also Sowerby's specimens figured in English Fungi, pl. 356, as *Sphaeria aurea*.

#### EPHELINA. Sacc. (figs. 28-30, p. 22.)

Ascophore at first tuberculose then splitting and exposing the disc, somewhat coriaceous, small, gregarious, sessile, springing from a blackish, parenchymatous, effused stroma; asci cylindrical, 8-spored; spores continuous, hyaline; paraphyses slender.

*Ephelina*, Sacc., Syll., vol. viii. p. 585.

*Ephelis*, Phil., Brit. Disc., p. 358 (not of Fries nor Sacc.)

The ascophores spring from a distinctly parenchymatous stroma, and amongst British genera the present genus is most closely allied to *Rhytisma*.

#### *Ephelina radicalis*. Mass. (figs. 28-30, p. 22.)

Ascophore  $\frac{1}{2}$ -1 mm. across, tuberculose then expanding, rough and blackish externally, disc greyish, sessile, gregarious on a blackish, distinctly parenchymatous stroma; asci narrowly cylindrical, spores 8, obliquely 1-seriate, slightly but distinctly clavate, smooth, hyaline,  $10 \times 4-5 \mu$ ; paraphyses slender, slightly thickened at the apex.

*Ephelina rhinanthi*, Sacc., Syll., viii. n. 2424.

*Ephelis rhinanthi*, Phil., Brit. Disc., 358 (1887).

*Rhytisma radicalis*, Cke., Grev., viii. p. 9 (1879).

Forming elongated, blackish, gouty swellings on basal part of stem or root of living plants of *Rhinanthus crista-galli*.

A true parasite, attacking the host during the summer and perfecting its fruit during the winter or early spring, according to Mr. Taylor, who first detected it and sent specimens to Dr. Cooke. Dr. Cooke finds stylospores early in the season, fusiform, acute, 3-septate,  $70 \times 5 \mu$ .

## Fam. II. STICTEAE.

The species are invariably minute and the ascophore always deeply immersed in the matrix, at first urceolate or cup-shaped, afterwards expanding. The excipulum, when present, is very thin and delicate, usually snow-white and minutely mealy, due to the presence of minute particles of oxalate of lime. The excipulum is at first continuous above, and after its rupture frequently becomes reflexed and forms an entire or toothed white margin surrounding the circular, elliptical, or irregularly angular, depressed disc. In some species the excipulum is almost obsolete, and the border of the disc, if present, is formed by the matrix. The disc is waxy in consistence, usually clear-coloured, white, yellow, or a tinge of pink being the predominating colours. Hypothecium always very thin.

Agreeing with Phacidieae in being immersed in the matrix, but distinguished by being waxy and not coriaceous, and in the clear light colour of every part.

All the specimens are saprophytes, growing on dead wood, bark, dry leaves, &c.

## ANALYSIS OF THE GENERA.

A. *Spores very long and slender, arranged in a parallel fascicle in the ascus.*

**Stictis.** Disc circular or elliptical, with a distinct white margin.

**Nemacyclus.** Disc elongated and narrow, bounded by two lips.

B. *Spores 2-seriate, continuous.*

**Propolis.** Disc elliptical or angular, whitish.

**Ocellaria.** Erumpent; disc circular, coloured.

C. *Spores 2-seriate, septate.*

**Phragmonaevia.** Disc exposed by a long slit.

**Cryptodiscus.** Disc irregularly circular.

D. *Spores muriform.*

**Melittosporium.**

STICTIS. Persoon. (figs. 22-26, p. 12.)

Ascophore immersed, closed above at first by the excipulum, which eventually ruptures and becomes reflexed, forming a more or less regular, white margin; disc depressed, waxy, circular or elliptical, clear-coloured, usually yellowish; asci elongated, 8-spored; spores very long and slender—needle-shaped—becoming septate, not breaking up at the septa, hyaline, arranged in a parallel fascicle in the ascus; paraphyses present.

*Stictis*, Persoon, Obs., ii. p. 73 (in part). Sacc., Syll., viii. p. 681.

*Schmitzonia*, Fries, Summa Veg. Scand., p. 63, (in part).

The genus as here understood, is marked by the upper portion of the excipulum forming a white margin round the circular or elliptical disc, and the needle-shaped, septate spores arranged in a parallel fascicle in the ascus.

**Stictis radiata.** Pers., Obs. Myc., ii. p. 73; Rehm, Krypt.-Flora, Disc., p. 176; Sacc., Syll., 2795. (figs. 22-26, p. 13.)

Scattered or gregarious, deeply immersed, closed at first, then opening above, and forming a reflexed, rather broad white border, split at various points; disc circular, pink or

yellow,  $\frac{1}{2}$ – $\frac{2}{3}$  mm. across; asci cylindrical, 8-spored; spores arranged in a parallel fascicle in the ascus, needle-shaped, multi-septate, hyaline,  $150\text{--}175 \times 2 \mu$ ; paraphyses slender, hyaline.

*Lycoperdon radiatum*, Linn., sp. pl., ii. p. 1645.

*Schmitzonia radiata*, Phil., Brit. Disc., p. 380.

On wood, twigs, &c.

Characterised by the broad, white, radiately split margin, and the flesh-coloured or dingy orange disc.

Specimens examined in Berk., Brit., Fung., n. 79; and Rehm, Ascom., n. 122.

**Stictis arundinacea.** Pers., Myc. Eur., i. p. 336; Sacc., Syll., n. 2833.

Scattered, immersed, usually orbicular, at first closed then rupturing and forming a narrow, almost or quite entire, snow-white, pruinose margin; disc somewhat depressed, greyish or whitish, up to  $\frac{2}{3}$  mm. across; asci cylindrical, 8-spored; spores needle-shaped, hyaline, multi-septate, arranged in a parallel fascicle in the ascus,  $125\text{--}150 \times 1.5\text{--}2 \mu$ ; paraphyses numerous, filiform, not incrassated at the apex, about  $1 \mu$  thick, hyaline.

*Schmitzonia arundinacea*, Phil., Brit. Disc., p. 380.

*Stictis graminum*, Desm., Crypt. Fr., exs., n. 1071; Phil., Brit. Disc., p. 386.

*Stictis luzulae*, Lib., Pl. Crypt. Ardu., n. 132.

On the sheaths of various grasses and sedges.

Authentic specimen from Persoon examined; also specimen in Desm., Crypt. France, exs., n. 1071; and Libert, Plant. Cr. Ard. n. 132.

**Var. junci.** Karst., Myc. Fenn., i. p. 238; Phil., Grev., vol. xviii. p. 84.

Scattered, covered at first, then erumpent and somewhat prominent, cup-shaped, with an almost entire, snow-white, minutely mealy margin; disc pale orange, or rosy, up to  $\frac{1}{2}$  mm. across; asci cylindrical, 8-spored; spores needle-shaped, arranged in a parallel fascicle in the ascus, hyaline, multi-septate  $110\text{--}130 \times 1\text{--}1.5 \mu$ ; paraphyses numerous, filiform, hyaline.

On culms of *Juncus effusus* and *J. conglomeratus*.

Specimen in Karst., Fung. Fenn., n. 931, examined.

**Stictis atro-alba.** Sacc., Syll., n. 2189.

Scattered, immersed, orbicular, about  $\frac{1}{2}$  mm. across, at first closed then opening and forming a recurved, narrow, white, almost entire margin that soon breaks away; disc depressed, dark grey or blackish; asci cylindrical, apex rounded, 8-spored; spores needle-shaped, apparently permanently continuous, hyaline, arranged in a fascicle,  $90-110 \times 1.5 \mu$ ; paraphyses equal throughout,  $1.5 \mu$  thick, hyaline.

*Schmitzonia atro-alba*, Phil. and Plow., Brit. Disc., p. 379, pl. xi. fig. 74.

On clematis branches.

Authentic specimen from Phillips examined.

The dark hymenium, narrow, white border, and needle-shaped spores characterise the present species.

**Stictis annulata.** Cke. and Phil., Grev., vol. ix. p. 8; Sacc., Syll., n. 2801.

Scattered or gregarious, deeply immersed, at first closed then opening and exposing the ochraceous, waxy disc; margin white, narrow, usually quite entire; circular,  $\frac{1}{2}-\frac{3}{4}$  mm. across; asci narrowly cylindrical, apex thick-walled, slightly narrowed, 8-spored; spores needle-shaped, both ends pointed, nearly as long as the ascus, hyaline, multi-septate,  $120-130 \times 1.5-2 \mu$ , arranged in a parallel fascicle, rather wavy; paraphyses numerous, filiform, equal, about  $1.5 \mu$  thick, hyaline.

*Schmitzonia annulata*, Phil., Brit. Disc., p. 379.

On branches of honeysuckle.

Type specimen examined.

A very neat species, readily distinguished by having the snow-white, reflexed narrow margin quite entire and looking like a white ring surrounding the deeply immersed, ochraceous disc.

## NEMACYCLUS. Fekl. (figs. 27-30, p. 12.)

Ascophore immersed, elliptic-oblong; disc plane or somewhat concave, waxy, pallid, exposed by the formation of an elongated slit in the epidermis which forms two spurious lips, proper margin rudimentary; asci clavate, 8-spored;

spores long and slender, hyaline or only slightly tinged with yellow, continuous or septate, arranged in a parallel fascicle in the ascus; paraphyses branched above.

*Nemacyclus*, Fuckel, Symb. Myc., Append. ii. p. 49; Sacc., Syll., viii. p. 701.

*Stictis*, *Propolis*, and *Schmitzomia*, of authors.

Allied to *Stictis*, but distinguished by the elongated splitting of the epidermis into two lips, and the rudimentary proper margin.

***Nemacyclus niveus*.** Sacc., Consp. Disc., p. 12; Sacc., Syll., viii. n. 2878; Rehm, Krypt.-Flora, Disc., p. 173, figs. 1-5, 125. (figs. 27-30, p. 12.)

Scattered, immersed, erumpent; covered at first by the whitened epidermis, which splits longitudinally and forms two spurious lips that soon disappear; disc pallid, elliptical or elliptic-oblong, up to  $\frac{1}{2}$  mm. long; asci cylindric-clavate, apex rather narrowed, 8-spored; spores long and narrow, worm-shaped, both ends rather blunt, continuous, usually 4-guttulate, slightly curved, hyaline  $75-85 \times 3 \mu$ , arranged in a parallel, slightly curved fascicle in the ascus; paraphyses very slender, slightly longer than the asci, septate, branched and tinged yellow at the tips.

*Stictis nivea*, Pers., Myc. Eur., iii. p. 339.

*Schmitzomia nivea*, Phil., Brit. Disc., p. 381.

Specimen named by Persoon examined.

On fallen leaves of various conifers.

Conidial phase. Discs superficial scattered, soft when moist, resembling the ascophores in form and colour; horny and brownish when dry; conidia filiform, generally nearly straight, ends pointed, continuous, hyaline,  $60 \times .5-1 \mu$ .

### PROPOLIS. Fries. (figs. 52-56, p. 22.)

Ascophore immersed in the matrix, closed at first then opening, the rudimentary excipulum not forming a distinct margin; disc roundish or elliptical, almost plane, light-coloured; asci clavate, 8-spored; spores elongated, ends obtuse, hyaline, continuous, 2-seriate; paraphyses present, septate, tips usually branched.



*Propolis*, Fries, Summa Veg. Scand., p. 372; Rehm, Krypt.-Flora, Disc., p. 148; Sacc., Syll., viii., p. 648; Phil., Brit. Disc., p. 373 (in part).

Somewhat superficially resembling *Stictis* and *Nemacyclus*; differing from both in the 2-seriate spores.

**Propolis faginea.** Karsten, Myc. Fenn., i. p. 244; Rehm., Krypt.-Flor., Disc., p. 149; Sacc., Syll., viii. n. 2662. (figs. 52-56, p. 22.)

Mostly gregarious, immersed, rounded or more frequently oblong, straight or somewhat curved, with a spurious torn margin, disc mostly milk-white, sometimes with a tinge of red, blue, or yellow, finally brownish and farinose, 1-4 mm. long; asci broadly clavate, apex rounded, 8-spored; spores cylindrical, ends obtuse, slightly curved, with 2 or more guttulac, smooth, hyaline, continuous,  $21-30 \times 7-9 \mu$ ; paraphyses filiform, septate, about  $2.5 \mu$  thick, branched above and tinged yellowish.

*Propolis versicolor*, Fries, Summa Veg. Scand., p. 372; Phil., Brit. Disc., p. 376, pl. ix. fig. 73 (paraphyses unbranched).

*Propolis rhodoleuca*, Phil., Brit. Disc., p. 375.

*Propolis rosae*, Fekl., Symb. Myc., p. 254; Phil., Brit. Disc., p. 377.

On wood, branches, chips, &c.

Specimens examined from Fuckel's Fung. Rhen., n. 1276 and 1109; Cke., Fung. Brit., ed. ii., n. 463.

**Propolis rhodoleuca.** Fries, Summa Veg. Scand., p. 372; Rehm, Krypt.-Flor., Disc., p. 151.

Scattered or gregarious, variable in form, roundish, elliptical, or angular, up to  $2\frac{1}{2}$  mm. long; disc plane, whitish, tinged with red; becoming slightly pruinose; asci clavate, 8-spored; spores elliptic-oblong, ends obtuse, mostly straight, smooth, hyaline, with 1 or more guttulae,  $10-15 \times 5-6 \mu$ ; paraphyses very slender, septate, branched above and yellowish.

*Stictis strobilina*, Desmaz., Ann. Sci. Nat., 1842, p. 52.

*Propolis rhodoleuca*, var. *strobilina*, Phil., Brit. Disc., p. 375.

On scales of the cones of Scotch fir.

Closely allied to *P. faginea*, from which it is distinguished more especially by growing on cones.

## OCELLARIA. Tulasne. (figs. 34, 35, p. 22.)

Ascophore with or without a distinct margin, erumpent, surrounded by a torn edge formed by the bark of the host plant, when a true margin is present it is more or less connate with the spurious bark margin; disc almost plane, clear-coloured; asci cylindric-clavate, 8-spored; spores elongated, straight or slightly curved, biseriate, smooth, hyaline, continuous; paraphyses usually thickened and coloured above.

*Ocellaria*, Tul., Sel. Fung. Carp., iii. p. 129; Rehm., Krypt.-Flor., Disc., p. 133; Sacc., Syll., viii. p. 564.

*Propolis*, Phil., Brit. Disc., p. 373.

*Stictis*, of some old authors.

Growing on branches covered with bark, or on wood. Distinguished by the spurious, irregular margin formed by the torn and raised bark, surrounding the ascophore; when a true raised margin is present, it is within, and closely applied to the spurious margin; sometimes the latter falls away, leaving the true margin only, when the fungus superficially resembles a *Stictis*, but is distinguished by the very different, shorter and thicker spores.

\* *Spores elliptical.*

*Ocellaria aurea*. Tul., Sel. Fung. Carp., iii. p. 129; Rehm., Krypt.-Flor., Disc., p. 134; Sacc., Syll., 2690. (figs. 34, 35, p. 22.)

Scattered, gregarious, or sometimes confluent, circular or oblong,  $\frac{1}{2}$ - $1\frac{1}{2}$  mm. across, globoso-depressed, erumpent, surrounded by the torn bark, which forms a fringe, disc plane, patelliform, golden-yellow then brownish, soft at first, then firm; asci cylindric-clavate, thick-walled, apex obtuse, 8-spored; spores biseriate, elliptic-oblong, ends obtuse, straight or very slightly curved, continuous, hyaline, smooth, with 1-2 large or several small guttulæ,  $20-30 \times 10-12 \mu$ ; paraphyses filiform, septate, thickened at the summit, often curved, yellow.

*Peziza ocellata*, Pers., Syn. Fung., p. 667.

*Stictis lecanora*, Fries, Syst. Myc., ii. p. 193.

*Propolis lecanora*, De Not., Propost. Retif. Discom., p. 10; Phil., Brit. Disc., p. 374.

On dry branches of various species of willow and poplar.

There appears to be some uncertainty about the secondary form of fruit of the present species; possibly there may be two forms, or again, the bodies supposed to be pycnidia may be parasitic.

According to Tulasne the pycnidia are elongated, colourless, 2-4-celled,  $30-50 \times 1-1\frac{1}{2} \mu$ .

Phillips gives the following:—Pycnidia intermixed with the above, occupying the sides or summit of the same stroma, disc-shaped; stylospores oblong or oblong-elliptic, straight or slightly curved, issuing through the narrowly perforated epidermis; sterigmata branched, rather stout.

### *Ocellaria succinea*. Mass. (n. sp.)

Erumpent, usually in groups of three or four, somewhat turbinate, disc plane or very slightly convex, surrounded by a delicate, entire margin which is at first connate with the spurious bark margin, eventually becoming free; entirely pale amber-colour and almost translucent when moist,  $\frac{1}{2}-\frac{2}{3}$  mm. across; excipulum parenchymatous, cells 6-8  $\mu$  diam.; asci clavate, apex narrowed, pedicel long and slender, 8-spored; spores irregularly 2-seriate, smooth, hyaline, narrowly elliptical,  $14-16 \times 6 \mu$ ; paraphyses numerous, filiform, apex not thickened,  $1.5 \mu$  thick, agglutinated together with hyaline mucus.

On beech bark.

Distinguished from all other species by the small elliptical spores and pale amber colour.

### *Ocellaria pyri*. Mass.

Gregarious and usually in confluent groups of 2-3, erumpent, orbicular, fleshy, black with a purple tinge; disc plane or concave, margin irregular, up to 1 mm. across; excipulum composed of parallel, smoky-brown hyphae; asci clavate, apex rounded, base elongated and narrowed, 8-spored; spores uniseriate or sometimes 2-seriate at the apex, continuous, sometimes 1-2-guttulate, hyaline, elliptical, smooth,  $15-22 \times 7-9 \mu$ , with a narrow hyaline border; paraphyses very numerous, slender, rather wavy, sometimes branched, a little

longer than the asci, tips not thickened but agglutinated together with clear violet mucus.

*Stictis lecanora* (Schum.), var. *pyri*, B. & Br., Ann. Nat. Hist., n. 1624, t. 11, fig. 7.

*Propolis pyri*, Phil., Brit. Disc., p. 375.

On bark of pear tree.

Type specimen examined, also specimen in Phil., Elv. Brit., n. 148.

A distinct species, characterised by the purple-black disc and purple mucilage at the tips of the paraphyses. Hypothecium pale brown.

Phillips says the spores are "slightly tinted brown." I have not observed this coloration in the specimens examined, nevertheless this may be the condition at maturity. The present species departs from the usual type in having an obscure disc, yet it agrees with the genus in all essential morphological points.

\*\* *Spores fusiform.*

***Ocellaria punctiformis.*** Sacc., Syll., n. 2700.

Gregarious, immersed, urceolate, mostly orbicular, margin more or less irregularly torn, raised, up to  $\frac{1}{2}$  mm. across, hymenium dingy reddish-brown (when dry and old); asci cylindric-clavate, apex obtuse, 8-spored; spores narrowly fusiform, hyaline, continuous,  $7-9 \times 2 \mu$ ; paraphyses slender, tips clavate.

*Stictis punctiformis*, Pers., Syn., p. 674; Phil., Brit. Disc., p. 386.

On dead willow wood.

Specimen in Herb. Kew, named by Persoon, examined.

Gregarious, disc depressed and surrounded by a raised margin, formed in the first instance by the excipulum proper to which the bark is connate; very frequently the bark falls away, leaving only the proper margin of the fungus, which then resembles a *Stictis*, from which the present differs in the short spores.

***Ocellaria chrysophaea.*** Quél.

Scattered, erumpent, orbicular; hymenium concave, reddish; border rather thickened, golden-yellow; asci cylindraco-cla-

vate or cylindrical; spores 8, fusiform, continuous,  $9-11 \times 2 \mu$ ; paraphyses filiform, slender, sometimes branched in the upper part, and slightly thickened at the apices.

*Peziza chrysophaea*, Pers., Syn. Fung., p. 674; Pers., Icon. Pict., p. 17, t. 8, f. 1-2.

*Stictis chrysophaea*, Pers., Myc. Eur., p. 335; Berk. & Broome, Ann. Nat. Hist., n. 996, t. 16, fig. 19; Cke., Hdbk., n. 2226.

On wych-elm.

About  $\frac{1}{2}-\frac{3}{4}$  of a line broad.

The above is the description and synonymy of what Phillips—Brit. Disc., p. 377, under the name of *Propolis chrysophaea* (Pers.)—considers to be the *Peziza chrysophaea*, Pers.; Quélet, however, has described a somewhat different species, which he also considers to answer to Persoon's fungus, as follows.

*Ocellaria chrysophaea*, Quélet, Enchirid. Fung., p. 332; Sacc., Syll., 2602; Rehm, Krypt.-Flora, Disc., p. 135.

Peridium orbicular, lenticular then urceolate, margin erect, golden, hymenium red; spores ellipsoid-oblong, yellowish.

On *Abies*.

Specimen accepted by Phillips as the present species, examined.

## PHRAGMONAEVIA. Rehm. (figs. 11, 12, p. 91.)

Ascophore innate, covered at first, then exposed by the rupture of the epidermis, either radiate and often forming four teeth, or by a simple elongated slit, excipulum forming a delicate margin; disc clear-coloured; asci clavate, apex often narrowed, 8-spored; spores 2-seriate, narrow and elongated, hyaline, at first continuous and guttulate, then 1-3-septate; paraphyses present.

*Phragmonaevia*, Rehm, Krypt.-Flora, Disc., p. 160; Sacc., Syll., viii. p. 674.

*Stictis*, of authors.

Distinguished at once by the 2-seriate septate spores.

*Phragmonaevia hysterioides*. Rehm, Krypt.-Flora, Disc., p. 162; Sacc., Syll., viii. n. 2771. (figs. 11, 12, p. 91.)

Gregarious, arranged more or less in lines, the long axis of

the fungus parallel to that of the leaf on which it is growing; covered at first, then exposed by the longitudinal splitting of the epidermis; excipulum composed of parallel, thin, smoky-olive hyphae, and forming a narrow, 2-lipped border, disc waxy, buff then brownish, 1 mm. or more long; asci cylindric-clavate, apex conspicuously narrowed, 8-spored; spores irregularly 2-seriate, hyaline, narrowly elliptic-oblong, ends obtuse, straight or slightly curved, at first continuous and 4-guttulate, then 3-septate,  $16-26 \times 4-5 \mu$ ; paraphyses numerous, hyaline,  $2.5-3 \mu$  thick, very slightly thickened at the apex, and passing gradually into the hyphae of the excipulum.

*Stictis hysterioides*, Desm., Ann. Sci. Nat., ser. ii. vol. xix. p. 365; Phil., Brit. Disc., p. 384.

On dry leaves of *Carex paludosa* and other sedges.

Specimen examined in Desm., Crypt. France, ser. i. n. 1317.

### CRYPTODISCUS. Corda. (figs. 13, 14, p. 91.)

Ascophore immersed, sometimes at length more or less emergent; disc waxy, nearly plane, irregularly circular, thickish, indistinctly marginate, pale-coloured, excipulum rudimentary; asci clavate, 8-spored; spores elongated, 2-more-septate, hyaline, irregularly 2-seriate; paraphyses slender.

*Cryptodiscus*, Corda, Icon. Fung., ii. p. 37; Sacc., Syll., viii. p. 669.

Superficially resembling *Stictis* and *Propolis*; differing from both in the 2-5-septate spores.

*Cryptodiscus pallidus*. Corda, Icon., ii. p. 37, t. xv. f. 129; Sacc., Syll., viii. n. 2746.

Gregarious, immersed, 2-3 sometimes more or less confluent, pallid, often dingy ochraceous when dry, circular or elliptic-oblong, up to  $\frac{3}{4}$  mm. across; asci clavate, 8-spored; spores irregularly 2-seriate, oblong-fusoid or with an indication of being clavate, hyaline, smooth, becoming 3-5-septate,  $12-17 \times 4-6 \mu$ ; paraphyses slender, hyaline, adherent at the tips.



*Stictis pallida*, Pers., Obs., ii. p. 74, t. 6, f. 7; Phil., Brit. Disc., p. 383.

On decorticated wood.

Specimen examined in Fries' Scler. Suec., n. 275.

Disc most frequently elliptic-oblong, whitish or tinged with red or ochraceous, proper margin almost obsolete, but bounded by the slightly raised wood of the matrix, which is whitish just surrounding the disc.

**Cryptodiscus microstomus.** Sacc., Syll., viii. n. 2758. (figs. 13, 14, p. 91.)

Sparsely scattered, minute, immersed then becoming rather prominent: margin dark brown, disc circular or broadly elliptical, ochraceous: about  $\frac{1}{4}$  mm. across; asci clavate, 8-spored; spores irregularly biserial, narrowly cylindric-fusiform, smooth, hyaline, 3-septate,  $14-16 \times 3 \mu$ ; paraphyses filiform, hyaline, apex not thickened, sometimes slightly branched.

*Stictis microstoma*, Carm., in Engl. Fl., vol. v. p. 213; Phil., Brit. Disc., p. 383.

On wood.

Type specimen examined.

Scattered, at first nearly white, with a minute orifice, round which it gradually assumes a darker hue, and at length, under a high magnifier, appears, when moist, of a subolivaceous black, resembling a minute *Sphaeria*. (Berk.)

**Cryptodiscus angulosus.** Karst., Rev., p. 166; Sacc., Syll., viii. n. 2757.

Gregarious, immersed in the parenchyma of the bark, at first covered then seated upon the epidermis: disc angular or rarely nearly circular, thin, at first with a bluish tinge, then dingy greenish-grey, pruinose, usually surrounded by about 4 obtusely triangular teeth, up to 1 mm. across; asci elongate-clavate, 8-spored; spores 2-seriate, elongated, slightly curved, hyaline with a tinge of yellowish-green, 3-septate,  $16-23 \times 3-4 \mu$ ; paraphyses not very distinct.

*Tropelis angulosa*, Karsten, Myc. Fenn., i. p. 244; Phil., Brit. Disc., p. 378.

On willow branches (*Salix caprea*).



**MELITTOSPORIUM.** Corda. (figs. 31–33, p. 12.)

Ascospore somewhat fleshy or waxy, immersed then erumpent, plane, round or oblong, shortly and irregularly marginate; asci cylindric-clavate; spores 1 or more in an ascus, longish, hyaline or pale olive brown, muriform, parenchymatous, many-celled; paraphyses slender, septate.

*Melittosporium*, Corda, Icon. Fung., ii. p. 38; Sacc., Syll., viii. p. 704.

*Stictis*, Cke., Hdbk., p. 735; Phil., Brit. Disc., p. 382.

Readily distinguished by the parenchymatous, muriform, many-celled spores.

**Melittosporium lichenicolum.** Mass. (fig. 33, p. 12.)

Ascophore immersed at first in the substance of the host, erumpent, becoming expanded and quite plane, with a slightly raised, minutely torn margin, which like the flat disc is blackish; asci elliptic-clavate, almost sessile, base rather broad; spores four in an ascus, broadly elliptical, 5-septate and muriform, pale olive-brown,  $30-35 \times 12-14 \mu$ ; paraphyses numerous, filiform, tip slightly thickened, colourless.

*Stictis lichenicola*, Mont., Ann. Sci. Nat., 1836, v. p. 281, tab. xiii. f. 3; Phil., Brit. Disc., f. 382; Cke., Hdbk., p. 735.

*Urceolaria scruposa*, var. *parasitica*, Sommf., Suppl. Fl. Lapp., 1826, p. 100.

Parasitic on the thallus of *Cladonia pyxidata* and also on other species of the same genus.

Superficially resembling a minute *Patellaria* when fully expanded. This species is by some authors considered as a lichen—Rehm, Krypt.-Fl., Disc., p. 173—but I think it is a genuine fungus; the disc when young is covered with a layer of amorphous particles of oxalate of lime, as in so many of the *Sticteae*.

**Melittosporium pteridinum.** Sacc., Syll., n. 2890. (figs. 31, 32, p. 12.)

Scattered, slightly immersed, circular or elongated, irregular in outline, open; disc pallid brown, not deeply de-

pressed; asci broadly clavate, apex rather acute; spores 8, irregularly biseriate, clavate or clavate-fusiform, 6-7-septate, becoming muriform, hyaline,  $28-44 \times 5-9 \mu$ ; paraphyses filiform, adherent.

*Stictis pteridina*, Phil. & Buck., in Bucknall's Fung. Bristol, pt. vi. p. 5, t. 1, fig. 6; Phil., Brit. Disc., p. 384.

On bracken stem.

### Fam. III. PATELLARIEAE.

Ascophore minute, superficial at maturity, sessile, usually discoid, with a blunt margin or immarginate, glabrous, blackish, rarely clear-coloured, rather horny when dry; asci 2-4-6-8-spored; spores hyaline or coloured, continuous or 1-many-septate; paraphyses present.

The present family is intermediate between Phacidieae and Dermateae, differing from the former in being more superficial at maturity and also in being patellate or discoid. From the latter in being glabrous, usually blackish, and not of a tough, corky consistency.

The genera *Celidium* and *Abrothallus* are parasitic on lichens and hepatics; the remainder are saprophytic, growing on wood, bark, &c.

### ANALYSIS OF THE GENERA.

#### A. *Spores continuous.*

##### \* *Spores hyaline.*

**Patinella.** Ascus containing 8 spores.

**Biatorella.** Ascus containing innumerable, very minute spores.

##### \*\* *Spores brown.*

**Lagerheima.**

#### B. *Spores 1-septate.*

##### \* *Spores hyaline.*

**Patellea.**

\*\* *Spores brown.*

**Abrothallus.** Parasitic on lichens.

**Karschia.** Not parasitic on lichens.

C. *Spores 2-many-septate.*\* *Spores hyaline.*

**Patellaria.** Ascophore discoid, plane; spores narrowly elliptical or fusoid.

**Heterosphaeria.** Ascophore subglobose; spores elliptic-oblong.

**Scutularia.** Spores very long and slender, needle-shaped.

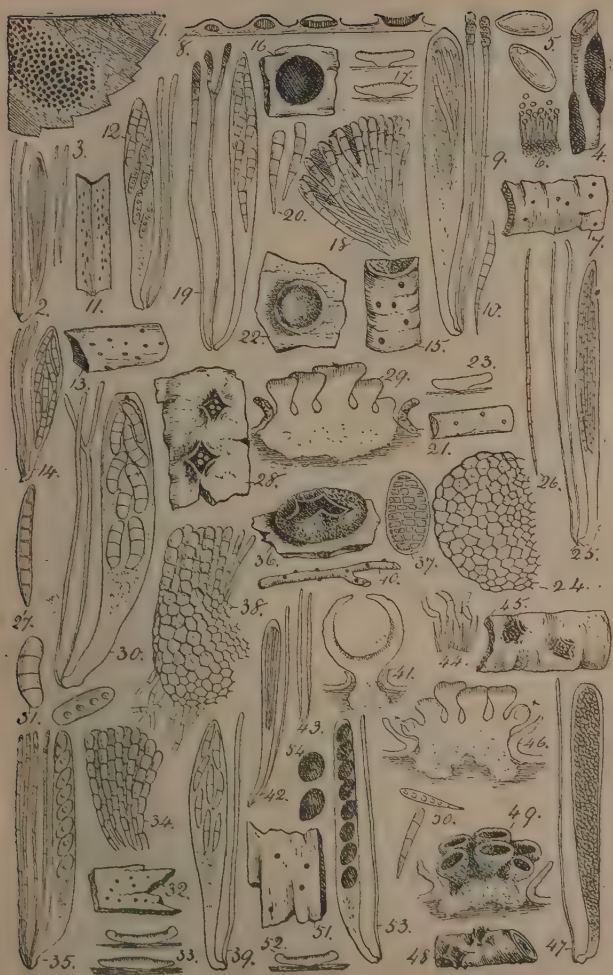
**Celidium.** Parasitic on lichens.

D. *Spores muriform.*

**Blitrydium.**

## FIGURES ILLUSTRATING THE PATELLARIEAE, &amp;c.

Fig. 1, *Rhytisma punctatum*, Fries, on leaf of sycamore, nat. size;—Fig. 2, ascus and paraphyses of same; highly  $\times$ ;—Fig. 3, spores of same;  $\times$  300;—Fig. 4, *Cryptomyces aureus*, Mass., small specimen on willow branch, nat. size;—Fig. 5, spores of same;  $\times$  300;—Fig. 6, conidia of same;  $\times$  300;—Fig. 7, *Coccophacidium pini*, Rehm; nat. size;—Fig. 8, sections of same in various stages of development;—Fig. 9, ascus and paraphyses of same;—Fig. 10, spore of same;  $\times$  300;—Fig. 11, *Phragmonaevia hysterioides*, Rehm; nat. size;—Fig. 12, ascus and paraphyses of same;  $\times$  300;—Fig. 13, *Cryptodiscus microstomus*, Sacc.; nat. size;—Fig. 14, ascus and paraphyses of same;  $\times$  300;—Fig. 15, *Patellaria clavispora*, B. & Br.; nat. size;—Fig. 16, same; mag.;—Fig. 17, sections of same;  $\times$ ;—Fig. 18, portion of exterior and margin of excipulum of same;—Fig. 19, ascus and paraphyses of same; highly  $\times$ ;—Fig. 20, spores of same;  $\times$  300;—Fig. 21, *Scutularia citrina*, Sacc.; nat. size;—Fig. 22, same;  $\times$ ;—Fig. 23, section of same;  $\times$ ;—Fig. 24, excipulum and margin of same in section;  $\times$ ;—Fig. 25, ascus and paraphyses of same; highly  $\times$ ;—Fig. 26, spore of same;  $\times$  300;—Fig. 27, *Patellaria loniceræ*, Phil., spore;  $\times$  300;—Fig. 28, *Scleroderris Houghtoni*, Sacc.; nat. size;—Fig. 29, section of stroma with ascophores of same;  $\times$ ;—Fig. 30, ascus and paraphyses of same; highly  $\times$ ;—Fig. 31, spores of same;



## PATINELLA. Sacc. (figs. 32-35, p. 91.)

Ascophore minute, sessile, scutellate or appanate, circular, or irregular, rarely elongated, furnished with a parenchymatous excipulum which forms a delicate margin; black or dark-coloured; asci clavate, apex rounded and thick-walled, 8-spored; spores elongated, hyaline, continuous, not guttulate, irregularly 2-seriate; paraphyses septate, apex coloured.

*Patinella*, Sacc., Grevillea, vol. iv. p. 22; Sacc., Syll., viii. p. 769; Rehm, Krypt.-Flora, Disc., p. 310.

*Patellaria*, of many authors.

The hyaline, continuous, biseriate spores and patellate ascophore characterise the present genus.

***Patinella rubro-tingens*. Sacc., Syll., viii. n. 3182.**

Usually densely crowded and forming long narrow blackish streaks 2-3 cm. long, rarely scattered towards the ends of the groups; ascophore circular or usually irregular from mutual pressure, sessile, rather fleshy, at first closed, then gradually expanding, black, minutely wrinkled outside, otherwise glabrous; margin with a reddish tinge, irregular, remaining slightly incurved, 1-1.5 mm. diameter; excipulum compact, grumous, indistinctly parenchymatous; asci narrowly clavate, 8-spored; spores 2-seriate, narrowly

× 300;—Fig. 32, *Patinella macrospora*, Mass.; nat. size;—Fig. 33, sections of same; ×;—Fig. 34, structure of margin of excipulum of same; ×;—Fig. 35, ascus and paraphyses of same; highly ×;—Fig. 36, *Blityridium caliciiforme*, De Not., ascophore; ×;—Fig. 37, spore of same; × 300;—Fig. 38, *Patellea pallida*, Mass., portion of excipulum; highly ×;—Fig. 39, ascus and paraphyses of same; × 300;—Fig. 40, *Crumenula ericae*, Phil.; nat. size;—Fig. 41, section of same; ×;—Fig. 42, ascus and paraphysis of same; highly ×;—Fig. 43, spores of same; × 300;—Fig. 44, conidia of same; × 300;—Fig. 45, *Tympanis conspersa*, Fr.; nat. size;—Fig. 46, section of a group of ascophores of same, springing from a stroma, and accompanied by two pycnidia, marked ×; ×;—Fig. 47, ascus and paraphysis of same; × 300;—Fig. 48, *Scleroderris ribesia*, Karsten; nat. size;—Fig. 49, group of ascophores of same; ×;—Fig. 50, spores of same; × 300;—Fig. 51, *Lagerheima sphaerospora*, Sacc.; nat. size;—Fig. 52, section of same; ×;—Fig. 53, ascus and paraphysis of same; highly ×;—Fig. 54, spores of same; × 300.

fusiform, or almost cylindrical, continuous, hyaline, smooth, 3-4-guttulate,  $10-14 \times 1.5-2 \mu$ ; paraphyses numerous, slender, equal, about  $1.5 \mu$  thick, tips not thickened, often wavy, and sometimes branched.

*Patellaria rubro-tingens*, B. & Br., in herb.; Phil., Brit. Disc., p. 367.

On decorticated oak wood.

Type specimen examined.

*Patinella macrospora*. Mass., Grev., vol. xxii. p. 44. (figs. 33-35, p. 91.)

Ascophore 1-1.5 mm. across, sessile and broadly adnate, margin slightly raised at first, often becoming quite plane with age, blackish, somewhat coriaceous; marginal cells of the excipulum small, erect, parallel, crowded, septate, slightly clavate, dark olive-green; asci cylindrical, narrowed downwards below the spore-bearing portion into an oblique pedicel; spores 8, obliquely uniseriate, broadly elliptical, ends rather acute, hyaline, continuous, usually 1-guttulate,  $11-12 \times 6-7 \mu$ ; paraphyses numerous, cylindrical, not thickened at the apex, septate  $1.5-2 \mu$  thick, colourless.

On rotten wood.

Gregarious; apparently distinct from all previously described species, the large acute pointed spores being the most pronounced character.

*Patinella flexella*. Sacc., Syll., viii. n. 3160; Rehm, Krypt.-Flora, Disc., p. 313.

Ascophore superficial or seated in cracks in the matrix, sessile, oblong or variously angular, often compressed, margin thin, more or less incurved, black; up to  $\frac{2}{3}$  mm. long; excipulum indistinctly parenchymatous, cells minute, dark-coloured; asci clavate, apex rounded, wall thick, 8-spored; spores irregularly 2-seriate, hyaline, elliptic-oblong, ends obtuse, continuous, straight, rarely very slightly bent, smooth,  $6-10 \times 3-4 \mu$ ; paraphyses septate, about  $2 \mu$  thick, branched, rather thickened and brown at the tip; hypothecium dark brown.

*Patellaria flexella*, Phil., Brit. Disc., p. 362.

On decorticated wood, especially coniferous.

Specimen examined in Rehm's Ascom., n. 164.



***Patinella olivacea*. Sacc., Syll., viii. n. 3167.**

Gregarious, sessile, appanate, at first circular and with a distinct, entire, tumid margin of a greenish-yellow colour; disc even, dingy olive-green then blackish; during growth the outline often becomes more or less irregular and lobed; externally blackish, rugulose; excipulum parenchymatous, cells large, very irregular in form, dark, towards the exterior forming parallel, densely packed, cylindric-clavate, 3-4-septate, obtuse hairs,  $30-50 \times 8-10 \mu$ ; numerous stout, septate, coloured hyphae are given off from the cells of the excipulum near its base; a dingy purple-red colouring matter is liberated from the tissue of the excipulum when treated with dilute potassic hydrate; asci narrowly cylindrical, apex rounded, 8-spored; spores obliquely uniseriate, elliptic-oblong or sometimes with a tendency to become clavate, continuous (perhaps becoming 1-septate), smooth, 2-guttulate, with an olive or bluish-green tinge,  $9-12 \times 4-5 \mu$ ; paraphyses filiform, septate, often forked near the base,  $1.5-2 \mu$  thick, apex clavate, colourless.

*Peziza olivacea*, Batsch, Elench., Fung. p. 127.

*Patinella olivacea*, Sacc., Syll., viii. n. 3167.

*Patellaria olivacea*, Phil., Brit., Disc., p. 361.

*Rhizina nigro-olivacea*, Currey, Linn. Trans., xxiv. p. 494, t. 51, f. 10-12.

*Patellaria violacea*, B. & Br., Fungi of Ceylon, n. 966, in Linn. Soc. Journ., vol. xiv. p. 108.

*Patinella violacea*, Sacc., Syll., n. 3164.

*Patellaria hirneola*, B. & Br., Fungi of Ceylon, n. 965, in Linn. Soc. Journ., vol. xiv. p. 108.

*Patinella hirneola*, Sacc., Syll., viii. n. 3168.

*Patellaria applanata*, B. & Br., Fungi of Ceylon, n. 967, in Linn. Soc. Journ., xiv. p. 108.

*Patinella applanata*, Sacc., Syll., n. 3169.

On old wood.

I should consider the spores to be hyaline under normal conditions, the bluish or purplish tinge being a stain derived from the colouring matter present in the excipulum; the asci are sometimes also stained. Spores constantly continuous in every specimen examined.

The type specimen of every species given as a synonym has been examined.



In Rehm's Krypt.-Flora, Disc., p. 341, what the author considers to be this species, is called *Karschia olivacea*, Rehm, and placed among doubtful species; the description given by Rehm agrees with the above, except that the spores are said to be 2-celled, and this may possibly be their ultimate condition.

BIATORELLA. De Not. (figs. 56-58, p. 12.)

Ascophores mostly scattered, sessile, or rather narrowed at the base at first; disc often rather depressed at first, and more or less marginate, then plane or slightly convex; usually clear-coloured, rarely blackish, waxy; asci clavate or cylindric-clavate, apex rounded and thick-walled, and containing numerous minute spores; spores globose or rather elongated, continuous, hyaline or with a yellow tinge; paraphyses generally branched, septate, spreading at the apex, scarcely coloured; hypothecium thick, rarely coloured.

*Biatorella*, De Notaris, Giorn. Bot. Ital., vol. i. p. 192; Rehm, Krypt.-Flora, Disc., p. 303.

*Tromera*, Massal., Flora, 1858, p. 507; Sacc., Syll., viii. p. 469 (in part).

*Lecidea*, Leighton, Brit. Lichen-Flora, p. 240.

Distinguished by the minute, discoid, waxy ascophores, and the asci containing numerous minute spores. Has been considered by many authors as belonging to the lichens, hence the literature is mostly contained in works on lichenology.

*Biatorella resinae*. Mudd, Man. Brit. Lich., p. 191; Rehm, Krypt.-Flora, Disc., p. 306 (not of Leighton, Lich.-Fl., p. 383). (figs. 56-58, p. 12.)

Ascophores gregarious, narrowed at the base, then sessile; disc depressed at first, and slightly margined, then plane or convex; reddish-brown or orange colour, waxy and firm; asci clavate, apex rounded, the upper portion of the wall thick, containing innumerable minute spores; spores globose, continuous, with a slight yellow tinge, about  $3\ \mu$  broad; paraphyses very numerous, about  $1.5\ \mu$  thick, septate, not agglutinated together, forked above, the apex very slightly

thickened and yellowish-brown; hypothecium thick, very pale yellow.

*Peziza resinae*, Fries, Syst. Myc., ii. p. 149.

*Tromera resinae*, Korb., Par., p. 453.

On resin on the trunk, also on the bark, of Scotch fir and spruce.

Authentic specimen from Mudd's collection examined; also the specimen (*Peziza resinae*, Fr.) in Fries' "Scler. Suec.," n. 334.

*Biatorella pinicola*. Th. Fries, Lich. Arct., p. 200; Rehm, Krypt.-Flora, Disc., p. 303.

Usually rather crowded, rather narrowed below at first, then sessile on a broad base, the disc becoming slightly convex and marginate, waxy, brownish, often blackish when dry, up to  $\frac{1}{2}$  mm. across; asci broadly clavate, containing numerous spores, wall thick; spores clavato-globose, hyaline, continuous, about  $3\ \mu$  broad; paraphyses agglutinated together, branched, septate, brownish at the tip; hypothecium almost colourless.

*Lecidea tantilla*, Leighton, Lichen-Flora, p. 382.

On pine bark, old palings, &c.

An examination of the specimen in Leighton's herbarium, now at Kew, enabled the above synonym to be given.

[*Lecidea resinae*, Leighton, Lichen-Flora of Gt. Brit., p. 383 (not of Fries).]

*Bistora elegans*, Zwackh, Lich., exs., n. 344.

*Biatoridium monasteriense*, Lahm, Körber, Par. Lich., p. 172.

This species, which was confounded by Leighton with *Peziza resinae*, Fries, Syst. Myc., ii. p. 149; *Lecidia resinae*, Fries, Obs., i. p. 180, is a true lichen.]

## LAGERHEIMA. Sacc. (figs. 51-54, p. 91.)

Ascophore minute, sessile, patellate, marginate; asci cylindric-clavate, 8-spored; spores 1-2-seriate, globose or elliptical, continuous, brown, smooth; paraphyses present.

*Lagerheima*, Sacc., Syll., vol. x. p. 55.

*Patellaria*, Phil., Grev., vol. xviii. p. 85.

Distinguished by the continuous, coloured spores.

*Lagerheima sphaerospora*, Sacc., Syll., x. n. 4671. (figs. 51-54, p. 91.)

Scattered or crowded, applanate, indistinctly marginate, thin, circular or slightly elongated, 1-2 mm. across; excipulum consisting of interwoven hyphae of a dingy olive colour; asci cylindrical, apex rounded, base narrowed, 8-spored; spores uniseriate, typically broadly elliptical, ends obtuse, smooth, continuous, clear brown, sometimes 1-guttulate,  $9-12 \times 7-8 \mu$ ; paraphyses numerous, filiform.

*Patellaria sphaerospora*, B. & C., in Cooke's Disc. U. States, p. 26 (name only); Phil., Grev., xviii. p. 85.

On decaying wood.

Type specimen examined.

In many asci the spores are all alike in form, as described above; in others, again, some of the spores are normal, others globose, angularly globose or piriform.

#### PATELLEA. Fries. (figs. 38, 39, p. 91.)

Ascophore erumpent, soon quite superficial, sessile, circular, patellate, coriaceous, contracting more or less when dry, blackish; asci cylindric-clavate, 8-spored; spores elliptic-oblong, hyaline, 1-septate; paraphyses present.

*Patellea*, Fries, Syst. Myc., ii. p. 149, emended by Saccardo in Consp. Gen. Disc., p. 67; Sacc., Syll., viii. p. 783.

*Patellaria*, of authors.

Distinguished by the 1-septate, hyaline spores.

#### *Patellea pallida*. Mass. (figs. 38-39, p. 91.)

Gregarious, sessile, pallid, discoid, plane, more or less contracted and concave when dry,  $\frac{1}{2}-\frac{3}{4}$  mm. across; excipulum parenchymatous, cells 8-11  $\mu$  diameter, running out into parallel septate hyphae at the margin, these become thinner inwards and gradually pass into typical paraphyses; brown, septate hyphae spring from the basal cells of the excipulum, and attach the fungus to its matrix; asci clavate, apex narrowed, 8-spored; spores narrowly cylindrical, ends rather narrowed, often slightly curved, hyaline, for a long time continuous, then 1-septate,  $12-14 \times 2-3 \mu$ ; paraphyses cylindrical, about 2  $\mu$  thick, hyaline.

*Patellaria pallida*, Berk., Ann. Nat. Hist., n. 1831 (1879), p. 212; Phil., Brit. Disc., p. 362.

*Patinella pallida*, Sacc., Syll., viii. n. 3163.

On smooth bark.

Type specimen examined.

Somewhat contorted, translucent, pale amber or horn-colour when dry. The spores appear to remain continuous for a long time, but distinctly 1-septate spores were seen in asci.

**ABROTHALLUS.** De Not. (emended.) (figs. 18-20, p. 12.)

Parasitic on lichens or hepatics; ascophore innate, erumpent, disc naked from the first, becoming convex; excipulum incomplete or entirely absent; asci clavate, 8-spored, sessile or nearly so; spores 1-septate, brown; paraphyses numerous, longer than the asci, adhering together.

*Abrothallus*, De Notaris, Giorn. Bot. Ital., ii. p. 192 (1846); Sacc., Syll., viii. p. 739.

*Lecidea*, Leighton, Lichen-Flora of Gt. Brit., p. 240.

Allied to *Celidium*, from which genus it is readily distinguished by the coloured spores.

**Abrothallus parmeliarum**, Arnold, Flora, 1874, p. 102; Sacc., Syll., viii. n. 3032. (figs. 18-20, p. 12.)

Ascophore erumpent, blackish-brown, very convex, almost hemispherical in section, disc minutely rugulose, rather shining, immarginate, excipulum absent; asci clavate, almost sessile; spores 8, irregularly biseriate, elliptic-oblong, ends obtuse, 1-septate, very slightly constricted at the septum, there is sometimes a very slight tendency on the part of the upper cell to become a little broader than the lower one,  $14-18 \times 4-6 \mu$ ; paraphyses very numerous, standing above the asci, agglutinated together, septate,  $3-4 \mu$  thick at the slightly thickened, olive-brown apex.

*Lecidea parmeliarum*, Leight., Lich. Fl., p. 386.

Parasitic on the thallus of various species of *Parmelia*.

Specimen in Herb., Kew, determined by Nylander, examined.

## KARSCHIA. Körber.

Ascophore sessile, superficial, more or less applanate, at first marginate then becoming almost or quite plane and without a margin; blackish; excipulum parenchymatous; waxy, rather horny when dry; asci clavate, 8-spored, wall thick at the apex; spores smooth, brown, 1-septate; paraphyses septate, apex thickened and coloured; hypothecium thick, mostly coloured.

*Karschia*, Körber, Parerg. Lich., p. 459; Rehm, Krypt.-Flora, Disc., p. 345; Sacc., Syll., viii. p. 779.

*Patellaria*, Phillips, Brit. Disc., p. 360.

***Karschia lignyota*.** Sacc., Syll., viii. n. 3200; Rehm, Krypt.-Flora, Disc., p. 346, fig. 1-5, p. 299.

Ascophores mostly scattered, sessile, circular, at first closed, then expanding and marginate, finally almost or quite plane and without a raised margin; excipulum parenchymatous, cells small, olive-green; blackish-olive then almost or quite black; waxy, horny when dry; up to 1 mm. across; asci clavate, apex rounded and with the wall thickened, 8-spored; spores elliptic-oblong, smooth, brown, 1-septate, the upper cell slightly wider than the lower one, slightly constricted at the septum,  $9-12 \times 4-5 \mu$ ; paraphyses septate, branched, slightly thickened, and brown at the apex; hypothecium pinkish-brown.

*Patellaria lignyota*, Fries, Syst. Myc., ii. p. 150; Phil., Brit. Disc., p. 360.

*Patellaria Strickeri*, Sacc., Fung. Ital., f. 1411.

*Karschia nigricans*, Rehm, Asc., n. 21.

*Arthonia melaspermella*, Nyl., Flora, 1865, p. 605; Leighton, Brit. Lich.-Flora, p. 416.

On old decorticated wood.

Specimen from Fries examined.

***Karschia Bloxami*.** Sacc., Syll., viii. n. 3208.

Ascophore sessile, fixed by a point, applanate, about  $\frac{2}{3}$  mm. across, gregarious, at first with a very delicate margin, then plane or convex and immarginate, black; excipulum parenchymatous, cells small, blackish-olive with a tinge of red

near the margin; asci narrowly clavate, apex slightly narrowed and thickened, 8-spored; spores elliptical or fusoid, smooth, brown, 1-septate,  $10-15 \times 5-7 \mu$ , irregularly biseriate; paraphyses filiform, septate, tips thickened, brown, and agglutinated together, not longer than the asci; hypothecium brown.

*Patellaria Bloxami*, Berk., in Herb.; Phil., Brit. Disc., p. 361.

On rotten wood.

Type specimen, now in Herb., Kew, examined.

Distinguished from *K. lignyota* by the narrower, cylindric-clavate ascus, and by the two cells of the spore being of equal size. The spores are sometimes almost elliptic-oblong, at others widest at the central septum, which is not constricted, and tapering to the two ends, giving a fusoid shape.

#### PATELLARIA. Wahlenb. (figs. 52-55, p. 12.)

Ascophore almost superficial, discoid and nearly plane at maturity, blackish, somewhat coriaceous, margin not prominent; cortical cells olive or sooty-brown; asci cylindric-clavate, 8-spored; spores elongated, elliptical or fusoid, hyaline, 2-many-septate; paraphyses present.

*Patellaria*, Wahl., Fl. Suec., n. 988; emended in Sacc., Syll., viii. p. 786; Phil., Brit. Disc., in part.

Distinguished by the elongated, hyaline, 2-many-septate spores.

The genus has been divided into two artificial sections depending on the number of septa present in the spores, but it must be borne in mind that the septa do not develop simultaneously, hence a species in which the spores are more than 3-septate at maturity may only present 1 or 3 septa in the immature condition.

\* *Spores 3-septate when mature.*

*Patellaria atro-vinosa*. Bloxam, MS., Currey, Linn. Trans., xxiv. p. 155, t. 25, fig. 31; Phil., Brit. Disc., p. 369 (not Berk. & Rad.).

Gregarious or crowded, circular or somewhat irregular,



applanate,  $\frac{1}{2}$ – $\frac{2}{3}$  mm. across, disc plane, blackish-brown, the slightly upraised margin with a reddish-brown or vinous tinge; asci cylindric-clavate, narrow and elongated, 8-spored; spores irregularly biseriate, narrowly cylindric-fusiform, straight or slightly curved, hyaline with a tinge of green, 3-septate,  $17\text{--}20 \times 4 \mu$ ; paraphyses slender, about  $1.5 \mu$  thick, hyaline, sometimes branched.

*Durella atro-vinosa*, Sacc., Syll., viii. n. 3259.

On bark.

Type specimen examined.

The disc is sometimes dark brown, margin lighter brown, with or without a vinous tinge. The spores may perhaps become 5-septate at maturity.

**Patellaria maura.** Phil., Brit. Disc., p. 368.

Ascophores sessile, scattered, at first globose, becoming patellate, fuliginous-black; margin raised, crenulate or torn, about 1 mm. across; asci cylindric-clavate, attenuated to a narrow base, 8-spored; spores narrowly elongate-fusiform or subcylindrical, straight or curved,  $30\text{--}38 \times 5\text{--}6 \mu$ ; paraphyses filiform, tips hooked or curled.

*Peziza (Mollisia) maura*, Phil. & Plow., Grevillea, vol. iv. p. 122, pl. 62, f. 3.

*Lecanidion maurum*, Sacc., Syll., n. 3270.

On dead wood.

From the figure given in "Grevillea" we learn that the spores are irregularly biseriate and multi-guttulate; also that the cortex of the excipulum is parenchymatous. The spores are presumably colourless, although we are not told so, and may possibly become septate, otherwise the species cannot be included in *Patellaria*.

**Patellaria proxima.** B. & Br., Ann. Nat. Hist., n. 965; Ser. iii. vol. vii. p. 12, tab. xvi. fig. 18 (1861); Phil., Brit. Disc., p. 363.

Sessile, gregarious, orbicular, plane or very slightly convex; black, disc often a tinge of olive or brown when moist, up to  $\frac{3}{4}$  mm. across; excipulum consisting of indistinct, more or less parallel, dingy olive hyphae; asci clavate, apex rounded, attenuated into a slender pedicel, 8-spored; spores irregularly 2-seriate, narrowly elliptic-



oblong, straight or slightly curved, hyaline, for a long time 3-septate, then sometimes becoming 4-5-septate, smooth,  $18-24 \times 5-7 \mu$ ; paraphyses very numerous, very slender, rather wavy, more or less agglutinated together at the slightly thickened, coloured tips; hypothecium pale brown.

*Lecanidium proximum*, Sacc., Syll., viii., n. 3261.

On old weathered oak wood.

Type specimen examined.

*Patellaria clavispora*. B. & Br., Ann. Nat. Hist., n. 774; Ser. ii. vol. xiii. p. 19 (1854); Phil., Brit. Disc., p. 366, pl. xi. fig. 70. (figs. 15-20, p. 91.)

Gregarious, bursting through the bark when present, at first subglobose, then expanding and becoming marginate, rather fleshy, contracting and slightly concave when dry, pitch-brown, glabrous, 1-1.5 mm. across; excipulum consisting of interwoven hyphae which become clavate, septate, brown, and arranged more or less parallel at the surface and margin; asci clavate, apex narrowed, 8-spored; spores biseriate upwards, in 1 row below, narrowly clavate, apex rounded, base tapering and acute, straight or very slightly curved, hyaline or with a tinge of green, 3-5-septate, with an indication of a constriction at the septa when mature,  $30-36 \times 5-6 \mu$ ; paraphyses numerous, slender, tips clavate or irregularly nodulose, septate, brown, adhering, sometimes branched.

*Durella clavispora*, Sacc., Syll., n. 3257.

On branches of privet, ash, &c.

Type specimen examined.

Readily distinguished under the microscope, by the clavate, septate spores, and paraphyses with brown, thickened tips.

*Patellaria macrospora*. Phil., Brit. Disc., p. 367; Rehm, Krypt.-Flora, Disc., p. 334.

Usually gregarious, often on a pale crust-like patch, clavate and closed at first, then expanding and becoming nearly plane, black, margin greyish, up to  $\frac{1}{2}$  mm. across; excipulum composed of parallel, thin, brown hyphae radially arranged; asci clavate, apex rounded, 8-spored; spores 2-seriate, hyaline, narrowly fusiform, often with the widest

part above the middle, and the apex blunt, straight or slightly curved, at first continuous and 2-6-guttulate, then 3-5-septate,  $15-21 \times 3-4 \mu$ ; paraphyses slender, septate, branched above, tips  $3-4 \mu$  across, olive-brown.

*Durella macrospora*, Fckl., Symb. Myc., p. 281, tab. vi. fig. 24.

*Durella compressa*, Sacc., Syll., viii. n. 3242.

On dead wood, oak, &c.

Specimen examined from Fuckel's Fung. Rhen., n. 1165; and Phillips' Elv. Brit., n. 131.

Saccardo is probably correct in considering the present species to be the same as *P. compressa*.

**Patellaria compressa.** Phil., Brit. Disc., p. 364.

Scattered or gregarious, on a pale spot, sessile, innate, irregularly elliptical or roundish, with a delicate upraised margin, saucer-shaped when expanded, up to 1 mm. across, blackish-brown, compressed and shell-shaped when dry; asci clavate, rounded above, wall thick, 8-spored; spores elliptic or more or less fusiform, ends obtuse, 3-5-septate, straight or slightly curved, hyaline,  $18-21 \times 4-5 \mu$ ; paraphyses forked, septate, brownish at the apex; hypothecium yellowish.

*Peziza compressa*, Pers., Disp. Meth. Fung., p. 34.

*Durella compressa*. Tul., Sel. Fung. Carp., iii. t. 22, figs. 8-14; Rehm, Krypt.-Flora, Disc., p. 287, figs. 1-4, p. 282; Sacc., Syll., viii. n. 3242.

On dead wood.

Phillips gives the spores as  $8-11 \times 3.5 \mu$ , which is smaller than I have seen in the many specimens examined.

*Stylospores* sometimes present at the tips of the paraphyses, and resembling the ascospores in form and size.

**Patellaria connivens.** Fries, Summa Veg. Scand., p. 366; Phil., Brit. Disc., p. 365. (figs. 52-55, p. 12.)

Gregarious, innate, seated on a white or greenish spot, sessile, rounded or elongated, up to  $\frac{1}{2}$  mm. long, blackish-red, saucer-shaped when expanded, compressed and irregular when dry, excipulum thin, parenchymatous, cells small, irregularly polygonal; asci clavate, apex rounded, 8-spored, elliptic-fusiform, straight or slightly curved, at first 6-8-

guttulate, then more or less distinctly 3-7-septate, hyaline,  $21-27 \times 5-6 \mu$ ; paraphyses branched, very slender, apex yellowish; hypothecium thin, almost colourless.

*Peziza connivens*, Fr., Syst. Myc., ii. p. 151.

*Durella connivens*, Rehm, 26th. Ber. d. Natur. Ver. Augsb., p. 9; Sacc., Syll., viii. n. 3244.

On branches of oak and beech, also on wood.

**Patellaria lonicerae.** Phil., Brit. Disc., p. 364. (fig. 27, p. 91.)

Gregarious, sessile, entirely blackish, somewhat hemispherical then expanding, but the margin remaining more or less incurved, glabrous, up to  $\frac{1}{3}$  mm. across; excipulum consisting of irregularly parallel, brown, septate hyphae; asci broadly clavate, usually curved, 8-spored; spores irregularly biseriate, narrowly cylindric-fusiform, hyaline, at first many-guttulate, finally 7-septate, often very slightly curved,  $30-42 \times 4-7 \mu$ ; paraphyses numerous, filiform, about  $1.5 \mu$  thick, sometimes branched, tips not thickened, hyaline.

*Lecanidion lonicerae*, Sacc., Syll., viii. n. 3267.

On dead honeysuckle stem.

Authentic specimen from Phillips examined.

**Patellaria atrata.** Fries, Syst. Myc., ii. p. 160; Phil., Brit. Disc., p. 366; Rehm, Krypt.-Flora, Disc., p. 334, figs. 1-6, p. 295.

Usually gregarious, black, sessile, at first clavate and closed, then expanding and becoming plane or slightly convex, marginate, orbicular or somewhat elongated, up to  $1\frac{1}{2}$  mm. across, subcoriaceous; excipulum consisting of parallel, septate, olive-brown hyphae; asci clavate, apex rounded, 8-spored, wall thick; spores irregularly 2-seriate, elongated and narrowly clavate, or fusiform with the widest part above the middle and the apex blunt, often very slightly bent, hyaline, many-guttulate, then 7-11-septate,  $35-45 \times 8-10 \mu$ ; paraphyses numerous, cylindrical, septate, branched above, the tips clavate or sometimes nodulose, olive-green,  $4-5 \mu$  thick, agglutinated together.

*Lichen atratus*, Hedwig, Spec. Musc. Frond., ii. p. 61, t. 21, fig. A.

*Lecanidion atratum*, Sacc., Syll., viii. n. 3261.

On decorticated wood, old sacking, &c., and according to Rehm, on stems of *Lappa* and *Centaurea*.

Specimen examined from Rehm's Ascom., n. 574, and Phillips' Elv. Brit., n. 90. The specimen in the Kew copy of Fries' Scler. Suec., n. 336, labelled "*Patellaria atrata*  $\beta$ , Fr.," is *Biatorella resinæ*, Mudd.

**\*\* Spores more than 3-septate when mature.**

***Patellaria atro-alba.*** Cooke, Hdbk., n. 2168; Phil., Brit. Disc., p. 369.

Gregarious or scattered, about  $\frac{2}{3}$  mm. across, concave then plane and applanate, orbicular, externally and the margin black, disc white; asci clavate, apex narrowed, 8-spored; spores irregularly 2-seriate, hyaline, 5-7-septate, narrowly elliptic-fusiform, straight,  $27-33 \times 5 \mu$ ; paraphyses slender, hyaline.

*Lecanidion atro-album*, Sacc., Syll., viii. n. 3275.

On decorticated branches.

Type specimen examined.

A very distinct and remarkable species, possessing all the morphological features of a typical *Patellaria*, but unique in the white disc.

***Patellaria subpecta.*** Cke., in Phil., Brit. Disc., p. 365.

Scattered or gregarious, at first almost conical, then clavate, finally expanding and becoming discoid, about  $\frac{1}{3}$  mm. across, black; substance soft, collapsing when dry; excipulum parenchymatous, cells irregularly polygonal, 5-8  $\mu$  diameter, olive; paraphyses broadly clavate, often curved more or less, apex rounded, 8-spored; spores irregularly 2-seriate, elliptical or narrowly elliptic-oblong, hyaline, smooth, 2-4-guttulate, ultimately 3-septate,  $20-25 \times 5-6 \mu$ ; paraphyses numerous, slender, branched above and agglutinated together with olive mucilage; excipulum thin, colourless.

*Lecanidion subpectum*, Sacc., Syll., viii. n. 3268.

On inner bark of *Cistus laurifolius*.

Type specimens examined.

Cooke says, "Stylospores in the same hymenium, elongated, cylindrical, 5-8-guttulate, curved, on short sporophores seated amongst the asci,  $30-50 \times 5 \mu$ ."

**Patellaria crataegi.** Phil., Grev., vol. xvii. p. 46; Sacc., Syll., viii. n. 3276.

Caespitose or scattered, erumpent, subglobose then patellate, fixed by a central point, orbicular or the distinct margin sometimes more or less wavy, 1-1.5 mm. across; disc black, externally blackish-brown; excipulum white, composed of radiating, parallel, closely packed hyphae that become thickened, septate, and dark olive towards the surface; asci narrowly clavate, apex narrowed, base contracted into a slender pedicel, 8-spored; spores narrowly fusoid, the broadest part sometimes above the middle, multi-guttulate, then 3-5-septate, hyaline,  $35-60 \times 4.5-6 \mu$ ; paraphyses slender and hyaline below, becoming, wider, septate, often more or less swollen at the septa, and brownish olive at the tips; passing gradually into the structure of the excipulum.

On twigs of hawthorn and blackthorn.

The specimens on which Phillips founded the species do not appear to have been quite mature. In a batch forwarded to Kew for identification by Lars Romell, from Sweden, some of the ascophores are exactly in the condition described by Phillips, while others show the spores 3-5-septate. Phillips describes the spores as "faintly coloured," this was not observed.

**Patellaria minutissima.** Phil., Brit. Disc., p. 362.

Gregarious or scattered, about  $\frac{1}{4}$  mm. across, sessile, expanded when moist, compressed and somewhat contracted in the matrix when dry; margin entire, incurved; disc sooty-brown, externally blackish-brown; asci clavate or cylindric-clavate, 8-spored; spores elliptical, hyaline, 2-3-guttulate, at length 3-septate,  $6 \times 3 \mu$ ; paraphyses filiform, slightly thickened at the bent tips.

*Lecanidion minutissimum*, Sacc., Syll., viii. n. 3278.

On decayed wood.

**Patellaria lecideola.** Karst., Myc. Fenn., p. 234, Phil., Brit. Disc., p. 364; Rehm, Krypt.-Flor., Disc., p. 330.

Gregarious on a greyish spot, almost clavate and closed at first, then expanding, sessile, concave, horny, externally blackish-brown, disc black up to  $\frac{1}{3}$  mm. diameter; excipulum

composed of very long, narrow, olive-brown cells radially arranged; paraphyses narrowly cylindrical, 8-spored; spores irregularly 2-seriate, narrowly elliptical, ends rather pointed, becoming 3-septate, hyaline,  $12-18 \times 4-5 \mu$ ; paraphyses slender, about  $1\frac{1}{2} \mu$  thick, hyaline, suddenly becoming pear-shaped and brown at the apex; hypothecium colourless.

*Peziza lecideola*, Fries, Summa Veg. Scand., p. 151.

*Durella lecideola*, Sacc., Syll., viii. n. 3246.

On dead wood of poplar and birch.

Specimen examined from Klotzsch, Herb. Myc., ed. nov. Rabenh., n. 217.

The present species is almost intermediate between *Durella* and *Patellaria*; agreeing with the former in the thin, colourless hypothecium; with the latter in the firm excipulum not being truly parenchymatous.

*Patellaria hyperici*. Phil., Grevillea, x. p. 69; Brit. Disc., p. 363.

Gregarious or sometimes confluent and irregular in outline, very minute, sessile and sinuate at first, then somewhat superficial, discoid, very thin, immarginate when moist, somewhat concave and marginate when dry, glabrous, blackish-brown, up to  $\frac{1}{4}$  mm. across; excipulum minutely parenchymatous; asci clavate, narrowed below into a slender pedicel, 8-spored; spores elliptic-oblong, ends obtuse, hyaline, 3-septate, straight or very slightly curved,  $17-20 \times 5-7 \mu$ ; irregularly 2-seriate; paraphyses numerous, filiform, about  $2 \mu$  thick, hyaline, apex very slightly or not at all thickened.

*Lecanidion hyperici*, Sacc., Syll., viii. n. 3288.

On dead stems of *Hypericum*.

Specimen in Phil., Elv. Brit., n. 191, examined.

Cups 100 to  $300 \mu$  broad, at first sinuate, then emerging. The sporidia of this species germinate freely within the ascus, thrusting the germ-tubes through the walls of the ascus; the free sporidia often present a germ-tube twice their length while yet in the hymenium. (Phil.)

[It will be observed that the species, unfortunately, have not been arranged under the two sections depending on the number of septa.]



## HETEROSPHERIA. Grev. (figs. 47-51, p. 12.)

Ascophore erumpent, becoming superficial, globose but depressed above; at first closed above by a thin membrane and slightly umbilicate, then expanding and exposing the disc, margin ragged, coriaceous, dark-coloured; asci elongated, spores 8, septate at maturity, hyaline; paraphyses slender. Pycnidia are present in some species.

*Heterosphaeria*, Greville, Scot. Crypt. Fl., p. 103, pl. 103; Phil., Brit. Disc., p. 371, pl. xi. f. 71; Sacc., Syll., 8, p. 775.

Not closely allied to any other British genus. The spores remain for a long time continuous, but become 3-septate when quite mature.

*Heterosphaeria patella*. Grev., Scot. Cr. Fl., p. 103, pl. 103; Phil., Brit. Disc., p. 371, pl. xi. f. 71; Sacc., Syll., n. 3187. (figs. 47-51, p. 12.)

Scattered, erumpent becoming superficial, subglobose and depressed above, sessile, umbilicate then expanding, the margin torn and sometimes finely striate, olive then blackish, coriaceous; disc pale;  $\frac{1}{2}$ - $\frac{3}{4}$  mm. across; asci cylindric-clavate, spores 8, irregularly biserial, elliptic-oblong, smooth, hyaline, often very slightly curved, continuous for a long time, then 1-3 septate,  $14-16 \times 4 \mu$ ; paraphyses filiform, apex fusiformly incrassated.

*Pycnidia*. Resembling the ascophore, stylospores slenderly fusiform, both ends acute, hyaline, about  $26 \times 3 \mu$ , sterigmata short, filiform, usually branched.

On dead herbaceous stems, more especially umbellifers.

Phillips says that asci and stylospores are sometimes associated on the same disc, and it is very probable that the asci always follow the stylospores.

## SCUTULARIA. Karsten. (figs. 21-26, p. 91.)

Ascophore erumpent, soon becoming quite superficial, orbicular, patellate, sessile, somewhat coriaceous or horny, margin entire or ragged; asci clavate, 8-spored; spores elongated, very slender, multi-guttulate or multi-septate; hyaline or with a slight tinge of colour; paraphyses present.



*Scutularia*, Karsten, Rev., p. 153; Sacc., Syll., viii. p. 807.

*Sphaeropezizella*, Karst., Rev., p. 157.

*Patellaria*, of many authors.

Distinguished by the long, slender, guttulate or septate spores.

***Scutularia citrina*.** Sacc., Syll., viii. n. 3317. (figs. 21-26, p. 91.)

Ascophore sessile, plane, rather fleshy, smooth and even, circular disc lemon-colour, externally paler,  $\frac{1}{2}$ – $\frac{2}{3}$  mm. across; excipulum parenchymatous, cells 9–12  $\mu$  diameter; asci narrowly cylindric-clavate, apex narrowed, pedicel often crooked, 8-spored; spores arranged in a parallel fascicle, hyaline, needle-shaped, ends pointed, multi-septate,  $80\text{--}100 \times 1.5\text{--}2 \mu$ ; paraphyses very slender, hyaline.

*Patellaria citrina*, B. & Br., Ann. Nat. Hist., n. 583; Ser. ii. vol. vii. p. 17; Phil., Brit. Disc., p. 370.

*Ascobolus citrinus*, Cheval., Fl. En. Par., i. t. 31.

On rose twigs lying in a running stream.

Berkeley's specimen examined.

Our plant answers exactly in outward appearance to that of Chevallier, having a broad, flat, yellow hymenium, with a pale border. The asci are clavate, and contain long filiform sporidia. We suspect these are what Chevallier calls asci, considering the included granules as sporidia. (B. & Br.)

***Scutularia vermifera*.** Sacc., Syll., viii. n. 3310.

Scattered, sessile, cupulate then patellate, black, glabrous, margin entire, about  $\frac{1}{2}$  mm. broad; asci broadly clavate, 8-spored; spores narrowly cylindrical, worm-like, multi-guttulate,  $30\text{--}35 \times 3 \mu$ ; paraphyses slenderly filiform, abundant, branched.

*Patellaria vermifera*, Phil., Brit. Disc., p. 369.

On dead branches of decorticated holly.

Specimen not examined.

***Scutularia littoralis*.** Sacc., Syll., viii. n. 3311.

Scattered or crowded,  $\frac{1}{2}$ – $\frac{4}{5}$  mm. across; externally black and granular, disc fuliginous-brown, concave, margin incurved, serrated; asci cylindric-clavate, 8-spored; spores linear-fusiform, 3–6-guttulate, straight or slightly curved,  $25 \times 2 \mu$ ; paraphyses filiform, slender.

*Peziza (Mollisia) litoralis*, Phil. & Plow., Grevillea, vol. iv. p. 121, pl. 62, fig. 4.

*Patellaria litoralis*, Brit. Disc., p. 368.

On dead wood washed up from a lock.

Not examined.

### CELIDIUM. Tul. (emended.) (figs. 14-17, p. 12.)

Ascophore parasitic on the thallus or apothecia of lichens; innate, erumpent, plane or becoming convex, blackish; excipulum incomplete or absent; asci clavate, sessile, wall often thickened at the apex, 6-8-spored; spores 3-septate, hyaline; paraphyses numerous, longer than the asci, more or less adhering to each other.

*Celidium*, Tulasne, Mem. p. 121 (1852); Sacc., Syll., viii. p. 742.

*Arthonia*, Leight., Lichen Fl. p. 414 (in part).

*Lecidea*, Leighton, Lich. Fl., p. 240 (in part).

The members of the present genus have until recently been considered as belonging to the *Lichenes* (=Lichen-fungi); but as there is no trace of a thallus, the algal element (gonidia) is necessarily absent; the fungal part, having its mycelium ramifying in the living tissues of its host, and its reproductive portion formed at the surface, alone being present.

***Celidium varians*.** Arnold, Flora, 1862, p. 313; Sacc., Syll., viii. n. 3044. (figs. 47-51, p. 12.)

Ascophore about 1 mm. across, dull black, more or less circular, plane then slightly convex, disc minutely rugulose, scattered or confluent; epithecium blackish green, internally brownish; asci obovate, base broad, sessile, wall very much thickened at the apex, 8-spored; spores in 2-3 irregular rows or altogether inordinate, oblong or oblong-clavate, ends obtuse, hyaline, 3-septate at maturity, often for a long time 1-2-septate,  $12-17 \times 5-7 \mu$ ; paraphyses numerous, longer than the asci, septate, somewhat clavate and blackish olive above, agglutinated together,  $3-4 \mu$  thick above.

*Lichen varians*, Dav., Trans. Linn. Soc., ii. p. 284 (1793).

*Arthonia varians*, Leighton, Lichen Flora, p. 426.

Parasitic on the apothecia, rarely on the thallus of *Lecanora glaucoma*, where it forms minute black points.  
Specimen in Larbal., Lich. exs., n. 155, examined.

**BLITRYDIUM.** De Not. (figs. 36, 37, p. 91.)

Ascophore coriaceous-fleshy, orbicular, base narrowed, at first closed and inflated, then splitting above somewhat irregularly, or becoming patellate with an almost entire margin; asci cylindrical, 2-4-8-spored; spores 1-seriate, broadly elliptical, muriform, hyaline or tinged with colour; paraphyses present.

*Blitrydium*, De Notaris, Disc., p. 20; Sacc., Syll., viii. p. 802.

*Tryblidium*, Rebert., Neom., p. 388; Cooke, Hdbk., p. 757.  
Readily distinguished by the very large, muriform spores.

***Blitrydium caliciiforme*.** De Not., Disc. p. 20; Sacc., Syll., viii. n. 3293. (figs. 36, 37, p. 91.)

Scattered or gregarious, depresso-globose, closed at first, then opening by an irregular stellate rupture of the upper part of the excipulum; disc concave, pallid with a pinkish tinge, grey or blackish when dry; externally blackish-brown, minutely rugulose or verrucose, 1.5-2.5 mm. across; excipulum indistinctly parenchymatous, cells minute, brownish; asci cylindrical, apex rounded, base narrowed, 2-4-spored; spores 1-seriate, elliptic-oblong, ends obtuse, with a tinge of greenish-yellow, muriform, cells small, numerous, cuboid,  $35-55 \times 17-21 \mu$ ; paraphyses numerous, about  $2 \mu$  thick, tips slightly or not at all thickened, sometimes branched, tinged yellow.

*Triblidium caliciiforme*, Reb., Neom. p. 388; Cooke, Hdbk., p. 757, fig. 358.

On branches of lime and oak, and on bark.

The ascophore bursts through a crack in the bark, but when adult and expanded appears to be quite superficial; base narrowed. Hypothecium thick.

***Blitrydium melaxanthum*.** Sacc., Syll., viii. n. 3307.

Scattered, sessile, globose at first, then expanding and becoming flat; disc pale dingy yellow; externally blackish-olive, margin rather fleshy, rugulose, incurved at opposite

sides when dry and forming a narrow central slit, about 1 mm. across; excipulum parenchymatous, cells minute, brownish; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, at first 3-septate, then with a few vertical or oblique septa becoming muriform, furnished with a narrow hyaline border, broadly elliptical, ends obtuse,  $21-26 \times 10-12 \mu$ ; paraphyses very numerous, slender, about  $1.5 \mu$  thick, hyaline, held together by mucus.

*Patellaria melaxantha*, Fries, Summa. Veg. Scand., p. 366; Phil., Brit. Disc., p. 370.

On dry wood, pine bark, &c.

Specimen in Rabh., Herb. Myc., ed. ii., n. 709, examined.

#### Fam. IV. DERMATEAE.

Ascophores erumpent, sessile or narrowed to a very short stem-like base, usually caespitose and springing in numbers from a common stroma; corky or coriaceous; blackish or brown, often scurfy or mealy on the outside; asci 4-8-spored, or in some genera containing numerous very minute continuous spores; when 8 in number in an ascus the spores are continuous, or 1-many-septate; paraphyses present.

Pycnidia and spermagonia are present in some genera.

The plants in this order are characterised by their firm texture and dark colour, varying from rhubarb-brown to umber-brown and black; they are nearly all erumpent, and the majority caespitose and united at the base, as if arising from a common stroma. (Phillips.)

#### ANALYSIS OF THE GENERA.

##### A. Spores hyaline.

**Cenangium.** Spores elliptical, continuous.

**Scleroderris.** Spores elliptical, 1-2-seriate, 3-many-septate.

**Tympanis.** Spores minute, innumerable.

**Crumenula.** Spores very long, needle-shaped, in a parallel fascicle.

B. *Spores coloured.*

**Schweinitzia.** Spores continuous.

**Phaeangella.** Spores 1-septate (hyaline in one species).

### CENANGIUM. Fries.

Ascophores erumpent, becoming superficial, often caespitose and springing from a common stroma; at first closed then becoming urceolate or patellate, coriaceous or somewhat horny, usually scurfy or mealy outside, blackish or brown; asci 4-8-spored; spores elongated, continuous, hyaline; paraphyses present.

Pycnidia or spermagonia present in some species.

*Cenangium*, Fries, Syst. Myc., ii. p. 180; Phil., Brit. Disc., p. 344; Sacc., Syll., viii. p. 556.

*Dermatea*, Fries, Summa Veg., p. 362; Sacc., Syll., viii. p. 550; Phil., Brit. Disc. (in part).

*Pezicula*, Sacc., Syll., viii. p. 310 (in part).

Distinguished by the crowded ascophores, which are frequently scurfy or mealy outside, and the hyaline continuous spores.

\* *Growing on Angiosperms.*

**Cenangium furfuraceum.** De Notaris, Disc., p. 30; Rehm, Krypt.-Flor., Disc., p. 219; Sacc., Syll., viii. n. 2331.

Caespitose or solitary, erumpent, sessile and attached by a narrowed base, rather dry and leathery, at first closed then expanding; margin remaining more or less incurved, entire, disc cinnamon, externally densely covered with rust-coloured scurf or meal; size very variable,  $\frac{1}{2}$ - $1\frac{1}{2}$  cm. across; hypothecium and excipulum consisting of thick-walled, hyaline, intricately interwoven hyphae, passing into parenchyma at the cortex, which runs out into irregular clusters of thick-walled, brown, subglobose cells, 10-13  $\mu$  diameter, forming the scurfy exterior; asci clavate, apex rather narrowed, running down into a long, slender pedicel, 8-spored; spores irregularly 2-seriate, hyaline, smooth, continuous, cylindric-oblong, ends obtuse, usually slightly

curved, 2-4-guttulate,  $6-12 \times 2.5-3 \mu$ ; paraphyses numerous, slightly thickened and brown at the tip.

*Peziza furfuracea*, Roth, Catal. Bot., p. 257, t. 9, fig. 3.

*Dermatea furfuracea*, Fr., Summa Veg. Scand., p. 362.

*Encoelia furfuracea*, Karst., Myc. Fenn., i. p. 218; Phil., Brit. Disc., p. 337.

On alder, hazel, &c.

Varying greatly in size from  $1\frac{1}{2}$  lines to  $\frac{1}{2}$  an inch broad. Caespitose or solitary, erumpent, variously deformed by pressure, coated with a pale rusty meal; hymenium cinnamon. (Phil.)

Specimen examined from Cooke's Fung. Brit., exs. n. 453.

### **Cenangium Bloxami.** Sacc., Syll., viii. n. 2343.

Gregarious or often caespitose, saucer-shaped, narrowed to a short, stem-like base, margin slightly wavy, coriaceous,  $\frac{1}{2}$ -1 cm. across; excipulum internally consisting of interwoven hyphae, becoming parenchymatous at the periphery, purple brown; disc brownish, externally blackish-brown and minutely verrucose or scurfy; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, elliptic-oblong, ends obtuse, smooth, hyaline, usually 1-2-guttulate,  $4-6 \times 2.5 \mu$ ; paraphyses filiform, not thickened upwards, adherent.

*Encoelia Bloxami*, Phil., Brit. Disc., p. 338.

On dead wood.

Fusiform, 1-septate stylospores, hyaline at first then tinged brown,  $20-24 \times 4-5 \mu$ , are very abundant on the disc along with the asci, and are borne singly at the apex of slender filaments resembling the ordinary paraphyses in length and thickness. The colours given above are derived from dried specimens, and may require modification when the living condition is observed.

Type specimen examined.

**Cenangium populneum.** Rehm, Krypt.-Flora, Disc., p. 220, figs. 2-5, p. 215; Sacc., Syll., viii. n. 2333.

Caespitose, rarely solitary, erumpent, sessile and attached by a narrowed point, thin and leathery; closed when young, then expanding, margin usually somewhat wavy, incurved, especially when dry, often irregular from mutual pressure;



disc dark brown, often paler with age, externally blackish somewhat wrinkled and minutely scurfy or mealy,  $\frac{1}{2}$ -1 cm. across; hypothecium and excipulum composed of hyaline, densely interwoven hyphae, passing into parenchyma at the cortex, which runs out into irregular groups of thick-walled, brown, almost globose cells 6-8  $\mu$  diameter and forming the scurfy exterior; asci cylindric-clavate, slenderly stipitate, 8-spored; spores irregularly 2-seriate, hyaline, smooth, continuous, cylindric-oblong, ends obtuse, straight or slightly curved,  $14 \times 3.5-4 \mu$ ; paraphyses numerous, septate, tip slightly thickened and brownish.

*Peziza populnea*, Pers., Teut. Disp. Meth. Fung., p. 35 (1797).

*Peziza fascicularis*, Alb. and Schw., Consp. Fung. Nisk., p. 315, t. 12, fig. 2 (1805).

*Encoelia fascicularis*, Karst., Myc. Fenn., i. p. 217; Phil., Brit. Disc., p. 336.

On dead branches of poplar, ash, willow, &c.

Distinguished from *C. furfuracea* by the thinner hyphae of the excipulum, smaller cells of the cortex forming the external scurf, larger spores, and blackish exterior of the ascophore.

Cups about 4 lines broad. Caespitose, 6 to 12 united, but sometimes solitary, thin, submembranaceous, hemispherical, but compressed, and margin sinuate; externally blackish, coated with a fugacious meal. (Phil.)

Specimens examined from Cooke's Fung. Brit., exs., n. 478, and Rehm's Ascom., n. 301.

*Cenangium pulveraceum*. Fries, Syst. Myc., ii. p. 181; Phil., Brit. Disc., p. 347; Rehm, Krypt.-Flora, Disc., p. 228; Sacc., Syll., viii. n. 2293.

Erumper, caespitose or sometimes gregarious, but distinct from each other, subglobose and closed at first, becoming hemispherical, margin incurved and closed when dry, disc pale yellow, externally blackish, but densely covered with white or greyish meal, narrowed below into a short, stem-like, hard base, which is blackish within, up to 1 mm. across; excipulum brownish, consisting of densely interwoven hyphae; asci clavate, pedicel slender, 8-spored; spores irregularly 2-seriate above, elliptic-oblong, ends obtuse, hyaline,



smooth, continuous, straight,  $5-9 \times 2-2.5 \mu$ ; paraphyses slender, slightly thickened and almost colourless at the tip.

*Peziza pulveracea*, A. & S., Consp. Fung: Nisk., p. 342, t. 8, fig. 2.

On bark of holly, birch, beech, sloe, &c.

Specimen in Vize, Micro-Fung. Brit., n. 387, examined.

### **Cenangium amoenum.** Mass.

Ascophores sometimes caespitose, sometimes circinate, arising from a blackish stroma, subglobose and closed at first, then expanding and becoming obconic and truncate; disc orbicular, nearly plane, immarginate; fleshy, glabrous, shining golden yellow, 1-1.5 mm. across; asci elongated cylindric-clavate, 8-spored; spores irregularly biseriate, elliptic-oblong, hyaline, continuous, usually slightly curved,  $16-19 \times 5-6 \mu$ .

*Dermatea amoena*, Tul., Bot. Ztg., 1853, p. 54; Phil., Grev., vol. xvi. p. 94.

*Pezicula amoena*, Tul., Carpol., iii. p. 184, pl. 21, figs. 1-9; Sacc., Syll., viii. n. 2022 (in note).

On dead oak branches. Autumn.

Cups not exceeding  $\frac{1}{2}$  a line, bursting forth in masses from the dry bark in autumn and winter. Spermatia naked, i.e., not inclosed in spermogonia, evanescent; they are straight or curved and continuous,  $3\frac{1}{2}-4$  rarely  $6 \mu$  long. Stylospores or conidia are produced in little unequal locula within the stroma, escaping through narrow chinks. They are narrowly oblong, sometimes claviform, continuous,  $192-225 \mu$  long,  $4-5$  or sometimes  $6-7 \mu$  broad. (Phillips.)

### **Cenangium cerasi.** Mass.

In groups of 2-4 or solitary, erumpent, sessile, at first globose, closed, and reddish-brown, expanding and becoming plane with a slightly raised, often wavy margin, disc blackish-brown, 2-4 mm. across; externally blackish, wrinkled, more or less mealy; hypothecium and excipulum yellowish, consisting of rather thick, intricately interwoven hyphae, passing at the extreme surface into a pseudoparenchymatous cortex of small, dark brown cells; asci clavate, thick-walled, 6-8-spored; spores irregularly biseriate, smooth, hyaline, cylindric-fusiform, ends obtuse, often 1-2-

guttulate, at length 1-septate, sometimes tinged brown at maturity,  $15-20 \times 4-5 \mu$ ; paraphyses septate, becoming gradually thicker upwards, tip yellowish-brown,  $5-6 \mu$  thick.

*Dermatea cerasi*, De Notaris, Disc., p. 18; Phil., Brit. Disc., p. 341; Sacc., Syll., viii. 2268; Rehm, Krypt.-Flora, Disc., p. 247.

*Peziza cerasi*, Pers., Teut. Meth. Disp. Fung., p. 35.

*Pycnidia*. Mixed with the ascophores or separate, conical, leathery, externally scurfy, dehiscing by a minute apical pore; stylospores hyaline, cylindric-fusiform, wavy, up to  $50 \mu$  long, apical on slender sterigmata.

*Micropera drupacearum*, Lev., Ann. Sci. Nat., iii. vol. v. p. 283.

*Spermogonia*. Smaller than the pycnidia; spermatia filiform, curved,  $13-16 \mu$ ; sterigmata very slender, short, branched.

*Sphaeria dubia*, Pers., Ic. Pict., iv. p. 4, pl. 20, t. 1.

On dry branches of bird cherry (*Cerasus avium*).

Specimen named by Persoon examined; also specimens from Cooke, Fung. Brit., exs., ed. ii., n. 659, and Rehm, Ascom., n. 421.

### **Cenangium dryinum. Mass.**

Usually caespitose in small clusters, or in lines, rarely solitary, erumpent, sessile and fixed by a small central point, subglobose and closed at first, then becoming plane or slightly convex, marginate or not, yellowish-red, dingy ochraceous when dry, about 1 mm. across, externally, and the disc very minutely pulverulent; excipulum composed of parallel septate hyphae, these become free from each other, broader, and more closely septate at the periphery, yellowish; asci clavate, pedicel rather long and narrowed, thick walled, 8-spored; spores irregularly 2-seriate above, elliptic-oblong, usually slightly curved, hyaline, contents often granular, continuous,  $25-30 \times 7-9 \mu$ ; paraphyses slender, tips clavate or capitate, up to  $6-7 \mu$  across, yellow-brown, septate; hypothecium yellow.

*Dermatia dryina*, Cke., Grev., vii. p. 62 (name only); in Phil., Brit. Disc., p. 340.

*Pezicula dryina*, Sacc., Syll., viii. n. 1302.

On oak bark.

Type specimen examined.

The present species possesses so many points in common with *Scleroderris rubi*, that I am by no means certain that it may not eventually prove to be a stage of the last named. The spores, certainly, so far as I have observed, are permanently continuous, but further observations may modify character. In Cooke's diagnosis the measurement given for the spores is too large.

The distinguishing points of the present species, as at present understood and contrasted with *S. rubi*, are: caespitose habit, slightly larger spores, less orange in colour, and growing on oak bark.

**Cenangium umbrinum.** Mass.

Caespitose, erumpent, turbinate and closed at first, soon expanding; disc nearly plane, umber, nearly black when dry; externally tawny then cinnamon, minutely scurfy, margin often more or less wavy, 1-2 mm. across; asci, cylindrical, 8-spored; spores elliptical, 1-guttulate at first, smooth, continuous, hyaline at first, then faintly tinged brown,  $15-16 \times 7 \mu$ ; paraphyses linear.

*Dermatea umbrina*, Cke. & Mass., Grev., vol. xxi. p. 72.

On dead branches of *Ulex*.

Described from type.

**Cenangium leoninum.** Cke. & Mass., Grev., vol. xxi. p. 72.

Caespitose, stipitate, at first turbinate and closed, then expanding, the pale, chestnut-brown disc becoming almost or quite plane, with a distinct upraised margin, which is strongly incurved when dry, up to 4 mm. across, external surface golden-yellow to tawny-orange, radiately rugulose and minutely velvety; excipulum composed of slender, hyaline hyphae much interwoven, and ending at the surface in inflated, hyaline, 1-2-septate hairs,  $15-20 \times 4-5 \mu$ , these form the velvety surface; stem 10-15 mm. long, stout at the base, yellow and velvety, often branched, each branch ending in an ascophore; asci cylindrical, stipitate, 8-spored; spores elliptical, 2-guttulate, hyaline, continuous,  $9-10 \times 4 \mu$ ; paraphyses filiform.

On hard decorticated wood.

Described from type specimen.

\*\* *Growing on Gymnosperms.*

*Cenangium abietis.* Rehm, Krypt.-Flora, Disc., p. 227; Sacc., Syll., viii. n. 2312.

Caespitose, erumpent, sessile but attached by a narrowed base, at first nearly globose and closed, then turbinate, finally expanding, but the margin remaining incurved, irregular from lateral pressure, incurved and closed when dry, coriaceo-membranaceous, 2-4 mm. across; disc yellowish or olive-brown, externally wrinkled and at first covered with a reddish brown powder; hypothecium and excipulum tinged brown, formed of densely interwoven hyphae, which pass into a very compact, dark brown parenchymatous cortex of small thick-walled cells; asci clavate, shortly stipitate, 8-spored; spores irregularly 2-seriate, or sometimes almost 1-seriate, hyaline, smooth, continuous, elliptic-fusiform,  $10-12 \times 5-7 \mu$ , often with granular contents; paraphyses rather longer than the asci, slender, tip thickened up to  $4-5 \mu$ , brownish.

*Peziza abietis*, Pers., Syn. Fung., p. 671 (1801).

*Cenangium ferruginosum.* Fries, Vet. Akad. Handb., p. 361 (1818); Phil., Brit., Disc., p. 346.

*Spermogonia.* Perithecia gregarious, erumpent, minute substipitate, orbicular, plane or umbilicate, black, at first closed then opening with a torn margin; sporules ovate-oblong, continuous, hyaline,  $8 \times 4 \mu$ .

*Dothichiza ferruginosa*, Sacc., Syll., iii. 3557.

On fallen branches of Scotch fir and other species of *Pinus*.

Distinguished from allied species by habitat and also by the broad spores.

Specimens examined from Cooke, Fung. Brit., ed. ii., n. 195; Rehm, Ascom. n. 578; Fries, Scler. Suec., n. 292, and Holl, Schmidt, and Kunze, Deutschl. Schwamme, n. cl.

*Cenangium nectrioides.* Mass.

Gregarious or caespitose, erumpent, reddish, sessile, at first subglobose then plane, orbiculate, reddish-brown; disc at first bright orange-red, becoming pale tan colour; asci cylindrical-clavate; spores 8, oblong-elliptic or oblong, rounded at the ends, with one or two large guttulae, straight or

slightly bent,  $20-25 \times 7 \mu$ ; paraphyses filiform, slender, branched.

*Dermatea nectrioides*, Phil., Brit. Disc., p. 340.

*Pezicula nectrioides*, Sacc., Syll., viii. n. 1301.

On cones of *Pinus sylvestris*.

Ascophores  $300-500 \mu$  broad, issuing singly or in groups of two or three through an elongated slit in the epidermis, which is usually black on the margin. They are at first globose, bright orange-red, shining, hardly to be distinguished from a *Nectria*; at a later stage the disc becomes plane or convex, and pale tan colour. (Phillips.)

Unknown to me.

**Cenangium acicolum.** Rehm., Krypt.-Flora, Disc., p. 228; Sacc., Syll., viii. n. 2314.

Gregarious, erumpent, at first clavate or top-shaped and closed then expanding; disc almost plane at maturity, yellowish brown, externally the same colour, the delicate margin somewhat paler; narrowed at the base into a very short, thick, stem-like base, 1-3 mm. broad, coriaceous, becoming contorted and minutely scurfy outside when dry; asci clavate, 8-spored; spores irregularly 2-seriate, hyaline, continuous, elliptical, straight, not guttulate,  $12-14 \times 3.5-4.5 \mu$ ; paraphyses slender, the yellow-brown tips clavate,  $4-5 \mu$  thick.

*Cenangium ferruginosum*, var. *acicolum*, Fuckel, Symb. Myc., p. 269.

On fallen leaves of Scotch fir.

Specimen in Fekl., Fung. Rhen., n. 1123, examined.

**SCLERODERRIS.** Fries. (figs. 28-31 and 48-50, p. 91.)

Ascophores erumpent, then superficial, often caespitose and springing from a common stroma, coriaceous or horny, brown or blackish, rarely bright-coloured, often more or less mealy or scurfy externally; at first closed then expanding and becoming patellate, margin often minutely irregular; asci 8-spored; spores elongated, becoming 3-many-septate, hyaline, rarely tinged with colour at maturity; paraphyses present.

*Scleroderris*, Fries, Syst. Myc., ii. p. 178; Sacc., Syll., viii. p. 594.

*Cerangium* and *Dermatea* (in part) of some authors.

The 3-many-septate, hyaline spores stamp the present genus.

\* *Growing on Angiosperms.*

*Scleroderris ribesia*. Karsten, Myc. Fenn., i. p. 215; Rehm, Krypt.-Flora, Disc., p. 209; Sacc., Syll., viii. n. 2456. (figs. 48-50, p. 91.)

Erumpent; ascophores 4-12, crowded on a common stroma, turbinate, stem-like base more or less developed, at first closed then expanded, but the minutely ragged margin persistently incurved, externally blackish-brown, margin minutely striately wrinkled, glabrous, coriaceous; excipulum composed of parallel, septate, brown hyphae that pass into a very narrow parenchymatous cortex; disc yellowish brown or greyish; 2-4 mm. across, 1-2 mm. high; asci narrowly cylindric-clavate, 8-spored; spores very narrowly clavate, apex rounded, base sharp, straight many-guttulate then 3-5-septate, hyaline  $25-40 \times 3-4 \mu$ , irregularly 2-seriate; paraphyses filiform, hyaline.

*Cenangium ribis*, Fries, Syst. Myc., ii. p. 179; Phil., Brit. Disc., p. 349.

*Peziza ribesia*, Pers., Tent. Disp. Meth. Fung., p. 35.

On twigs of red and black currant.

Specimen examined in Fries, Scler., Suec., n. 31. Also Rehm, Ascom., n. 422, and Vize, Micro-Fung. Brit. n. 485.

Pycnidia either separate or springing from the ascophores, subglobose, brown, glabrous, greyish and wrinkled when dry; substance of excipulum minutely parenchymatous; conidia elliptic-oblong, ends obtuse, hyaline, usually 2-guttulate,  $6-11 \mu$ ; conidiophores subulate, about  $3 \mu$  long.

*Sphaeria ribesia*, Link, Hdbk. iii. p. 76.

*Fuckelia ribis*, Bourd., Diss. Myc., iv. p. 135.

*Scleroderris seriata*. Rehm, Krypt.-Flora, Disc., p. 211; Sacc., Syll., viii. n. 2548.

Ascophores erumpent in narrow, black lines 1-2 cm. long, bursting through the bark at right angles to the long axis



of the branch, springing from a common, thin, blackish stroma, globose, rather depressed above, narrowed below into a very short, stem-like base, at length opening and becoming almost plane, usually more or less marginate, horny, blackish-brown, glabrous, up to 1 mm. high and broad; excipulum brownish, composed of densely interwoven hyphae, passing into a very compact, blackish cortex; asci clavate, apex narrowed, contracted below into a long, slender pedicel, 8-spored, spores hyaline, continuous, multi-guttulate, narrowly fusiform, ends pointed, usually curved,  $40-50 \times 3-3.5 \mu$ ; paraphyses slender sometimes branched, not thickened at the tip.

*Cenangium seriatum*, Fries, Syst. Myc., ii. p. 185; Phil., Brit. Disc., p. 348.

Spermogonia and Pycnidia occur along with the ascigerous form, and are usually more numerous.

*Spermogonia*. Subglobose, depressed above and opening by a minute pore; spermatia very narrowly lanceolate, ends acute,  $14-15 \mu$  long.

*Pycnidia*. Minute, conical, slender, blackish, furnished with an apical pore; stylospores hyaline, linear-lanceolate, ends pointed, curved, about  $30 \mu$  long.

On *Betula alba*. Rehm says also on *Sorbus aria*.

Specimens examined in Fries' Scler. Suec., n. 161, and Roum., Fung. Sel. Gal., n. 336.

The spores appear to be somewhat variable in size; Rehm says  $35-45 \times 3-4 \mu$ . This is the same as Tulasnes' measurements in Sel. Fung. Carp., iii. p. 160; Phillips says "pseudo-multi-septate,  $55-85 \times 2-3 \mu$ ."

### *Scleroderris frangulae*. Mass.

Erumpent, scattered or arranged in lines and springing from a thin, yellowish stroma, turbinate, truncate above, narrowed into a very short, stout, stem-like base, disc plane, dark brown, blackish when dry, externally blackish, subcoriaceous,  $\frac{1}{2}-1\frac{1}{2}$  mm. across; excipulum pseudoparenchymatous, pale brown, cortex composed of parallel rows of brown, septate hyphae; asci clavate, narrowed below into a slender pedicel, wall thick, 4 less frequently 8-spored; spores obliquely 1-seriate, elliptic-oblong, ends obtuse, smooth, at first continuous and 1-guttulate, finally 3-4-septate, pale



brown at maturity;  $15-21 \times 6-8 \mu$ ; paraphyses septate, often branched above, tips thickened, brown.

*Peziza frangulae*, Pers., Myc. Eur., i. p. 324.

*Tympanis frangulae*, Fries, Syst. Myc., ii. p. 174; Phil., Brit. Disc., p. 351.

*Dermatella frangulae*, Karst., Myc. Fenn., i. p. 209; Sacc., Syll., viii. n. 2021.

On branches of *Rhamnus frangula*.

Specimen in Cooke's Fung. Brit., n. 310, examined.

According to Fuckel—Symb. Myc., p. 279, tab. iv. fig. 46—the spores are muriform and brown at maturity.

*Pycnidia*. Intermixed with the ascophores, conico-globose, with a minute pore at the apex; stylospores elongate-ovate, straight or slightly curved, continuous, hyaline,  $25 \times 6.5 \mu$ .

*Sphaeronema versiforme*, A. & S., Consp. Fung. Nisk., p. 52, pl. ix. fig. 3.

### *Scleroderris rubi*. Mass.

Gregarious, erumpent, sessile but attached by a narrow central point, at first subglobose and closed, soon expanding and becoming patellate, plane or slightly convex, often more or less marginate, 1-1.5 mm. across, entirely orange-brown and minutely pulverulent; excipulum dingy orange, consisting of parallel rows of septate hyphae that become clavate, septate, and free from each other at the circumference, the terminal subglobose cells are sometimes studded with minute particles of lime; asci clavate or sometimes cylindrical, and narrowed abruptly into a short pedicel, wall thick, 8-spored; spores irregularly 2-seriate, elliptic-oblong or fusoid, straight or slightly curved, hyaline, often guttulate and with granular contents, smooth, for a long time continuous, finally 3-septate,  $18-25 \times 6-7 \mu$ ; paraphyses filiform, septate, tips clavate, coloured orange-brown, up to  $6 \mu$  thick; gradually passing into the structure of the excipulum; hypothecium yellow.

*Patellaria rubi*, Libert, Pl. Crypt. Arduen., Fasc. iii. n. 231 (1834).

*Peziza rhabarbarina*, Berk., Eng. Flora, vol. v. p. 197 (1836).

*Dermatea rubi*, Rehm, Krypt.-Fl., Disc., p. 253.

*Dermatea rhabarbarina*, Phil., Brit. Disc., p. 343.

*Pezicula rhabarbarina*, Sacc., Syll., viii. n. 1295.

On dead branches of bramble and dog-rose.

Specimens examined in Libert's Crypt. Ard., Fasc. iii. n. 231; Berk., Brit. Fung., n. 271; and Cooke, Fung. Brit., ed. ii., n. 656.

The ultimate cells of the hyphae of the excipulum soon break away and remain as glistening meal; the pulverulent appearance of the disc is due to the detached subglobose cells forming the tips of the paraphyses, which become free very readily, but remain on the disc. The spores remain continuous for a long time, and as a rule I find only this condition of things, yet I have, at the same time, certainly seen 3-septate spores, and they may probably become more than 3-septate.

**Scleroderris Houghtoni.** Mass. (figs. 28-31, p. 91.)

Solitary, more frequently caespitose, erumpent; ascophores at first globose, then turbinate, base often combined into a common stroma, dirty yellow, becoming brown; disc plane or convex, immarginate, pruinose; asci broadly clavate; spores 8, oblong-elliptic, often unequal-sided, greenish-hyaline, 3-guttulate, becoming 2-3-pseudo-septate,  $27 \times 6-9 \mu$ ; paraphyses filiform, branched.

*Dermatea Houghtoni*, Phil., Grev., vi. p. 24; Brit. Disc., p. 342.

*Dermatella Houghtoni*, Sacc., Syll., viii. n. 2032.

On dead branches of Portugal laurel.

The cups break through transverse slits in the bark, forming elongated groups, arising from a common stroma; within they are cinnamon-yellow. (Phillips.)

**Scleroderris fuliginosa.** Karst., Myc. Fenn., i. p. 216; Rehm, Krypt.-Flora, Disc., p. 210, figs. 3-7, p. 201; Sacc., Syll., viii. n. 2459.

Erumpent, caespitose or gregarious, grouped into broadly effused blackish patches, sessile but narrowed below into a stout stem-like base, springing from a thin, blackish stroma which spreads under the cuticle, at first obovate and closed at the slightly depressed summit, then opening by a small, torn mouth; disc greyish-white, externally blackish, naked,

thin and coriaceous,  $\frac{2}{3}$ - $1\frac{1}{2}$  mm. across; cortex composed of parallel, septate, dark brown hyphae radiating from base to margin; asci cylindric-clavate, narrow, rounded above, 8-spored; spores arranged in a parallel fascicle, hyaline, linear-fusiform, both ends pointed, straight or slightly curved, becoming 5-7-septate,  $60-70 \times 2.5-3.5 \mu$ ; paraphyses slender, hyaline, sometimes branched, tip not thickened.

*Cenangium fuliginosum*, Fries, Elench. Fung., ii. p. 23; Phil., Brit. Disc., p. 348.

*Pycnidia*. Accompanying the ascophores, globose, smooth, blackish, opening by a pore at the summit; stylospores narrowly fusiform or falciform, hyaline, straight or curved, 3-septate,  $20-30 \times 2.5 \mu$ .

*Pilidium carbonaceum*, B. & Br., Ann. Nat. Hist., n. 442.

On willow branches.

Specimen in Mong. & Nest., Stirp. Crypt., n. 889, examined.

**Scleroderris majuscula.** Cke. & Mass., Grev., vol. xxi. p. 73.

Erumpent then superficial, stipitate, large, scattered, tough, turbinate and closed, then expanding and becoming almost plane, margin slightly incurved, becoming strongly contracted and rigid when dry, 5-7 mm. across; disc dark purple-brown, externally clove-brown, glabrous but wrinkled when dry; stem about 2 mm. long, slender, expanding upwards into the ascophore; asci cylindrical, 8-spored; spores elliptical, ends narrowed, hyaline, 3-septate,  $15 \times 7 \mu$ ; paraphyses filiform.

On oak bark.

Described from type.

**Scleroderris pseudoplatani.** Mass.

Caespitose, erumpent, sessile or substipitate; disc at first convex then a little depressed, hoary-white, becoming at times pale yellowish brown; asci broadly clavate; spores 8, biseriate, oblong or oblong-elliptic, with 3 guttulae, at length 3-septate,  $15-17 \times 5-7 \mu$ ; paraphyses clavate at the summits.

*Dermatea pseudoplatani*, Phil., Grev., vol. xvii. p. 45; Sacc., Syll., viii. n. 2274.

On bark of *Acer pseudoplatanus*. October.

The cups are  $\frac{1}{4}$ – $\frac{1}{2}$  line broad, rarely single, erumpent, and remarkable for their hoary whiteness. (Phillips.)

Unknown to me.

**Scleroderris cinnamomea.** Mass.

Solitary or caespitose, sessile or substipitate, disc plane or convex, cinnamon-yellow, a little pulverulent beneath; asci clavate; spores 8, oblong, rounded at the ends, unequal-sided, 2- to 3-guttulate, at length 1- to 3-pseudo-septate,  $20\text{--}30 \times 8\text{--}10 \mu$ ; paraphyses filiform, slender.

*Dermatea cinnamomea*, Phil., Brit. Disc., p. 342, pl. x. fig. 65.

On maple bark.

A somewhat uncertain species, of which I have not seen a specimen. In the above description from Phillips, the spores are said to be "pseudo-septate," whereas in the figure in Brit. Disc., pl. x. fig. 65, some of the spores are distinctly and strongly 3-septate. Phillips considers this to be the *Peziza cinnamomea*, D. C., Flor. Fr., p. 13. Rehm, on the other hand, quotes Phillips's species under *Dermatea alni*, Rehm, with a query. Saccardo—Syll., viii. n. 1294,—on the other hand, quotes the plant of Phillips under *Pezicula cinnamomea*, Sacc., which in turn is considered as being identical with *Peziza cinnamomea*, D. C.

**\*\* Growing on Gymnosperms.**

**Scleroderris amphibola.** Gillet, Disc. Fr., p. 198; Sacc., Syll., viii. n. 2465.

Erumpent, soon quite superficial; usually scattered and solitary, rarely in small groups; sessile, attached by a central point, at first closed and subglobose, then expanding and becoming concave, finally plane or slightly convex, immarginate, black, slightly rugulose; excipulum formed of parallel, septate, olive hyphae, that become darker in colour and parenchymatous at the surface; asci clavate, apex rounded, wall thick upwards, narrowed and usually bent at the base, 8-spored; spores irregularly 2-seriate, or sometimes 1-seriate, narrowly fusiform, straight or slightly curved, hyaline, 3–5-septate,  $16\text{--}22 \times 3\text{--}3.5 \mu$ ; paraphyses a little

longer than the asci, slender, apex thickened and olive, sometimes branched, very numerous.

*Phragmophora amphibola*, Massal., Framm., p. 13.

*Tympanis amphibola*, Karsten, Symb. Myc., p. 252; Phil., Brit. Disc., p. 352.

On bark of Scotch fir.

Specimens examined from Karsten, Fung. Fenn., n. 840, and Saccardo, Myc. Ven., n. 1388.

According to Phillips the spermogonia are scattered, convex or subconical, minute; spermatia oblong, simple,  $3-5 \times 1-1.5 \mu$ .

### **Scleroderris livida.** Mass.

Gregarious or confluent, hemispherical then almost plane, slightly narrowed to a very short stem-like base, or almost sessile, but attached by a central point only, up to 1 mm. across, disc yellowish-olive, with a buff tinge when dry, margin and externally pale, very minutely scurfy; excipulum densely parenchymatous; asci narrowly clavate, apex narrowed, attenuated below into a longish, slender pedicel, thick-walled, 8-spored; spores irregularly biseriate above, elliptic-oblong, ends obtuse, smooth, hyaline, at first 4-guttulate, then 3-septate, straight or very slightly curved,  $24-30 \times 5-6 \mu$ ; paraphyses numerous, slender, somewhat irregularly curved, often with short branchlets, in other instances all simple and equal.

*Patellaria livida*, B. & Br., Ann. Nat. Hist., n. 775 (1854).

*Patellaria constipata*, Cke., Hdbk., n. 2176.

*Dermatea livida*, Phil., Brit. Disc., p. 340.

*Durella livida*, Sacc., Syll., viii. n. 3260.

*Dermatella livida*, Sacc., Syll., viii. n. 2027.

On bark of firs.

Type specimen examined.

### **Scleroderris fagi.** Mass.

Erumpent, the orbicular or elliptic groups 1 to 8 lines across, splitting the epidermis; ascophores plane or slightly convex, mostly immarginate, when moist orange-yellow, when dry ferruginous-yellow, pruinose, densely crowded on an evident stroma; stem when present stout, continuous with the stroma; asci broadly clavate; spores 8, elliptic or

oblong-elliptic, filled with coarsely grained protoplasm, sometimes becoming muriform,  $18-23 \times 9-12 \mu$ ; paraphyses slenderly filiform, abundant.

Stylospores oblong-elliptic or elliptic,  $10-20 \times 7-9 \mu$ , produced on the surface of the stroma in tufts between the ascophores or clavate sporophores.

*Dermatea fagi*, Phil., Brit. Disc., p. 344.

*Dermatella (Dermina) fagi*, Sacc., Syll., viii. n. 2033.

On *Fagus sylvatica*.

The ascophores are  $\frac{1}{4}-\frac{1}{2}$  a line broad. The conidia are produced in such quantity as to form a pale stratum visible under a pocket lens. (Phillips.)

If the spores are truly muriform at maturity, the present species would form the type of a new genus, which, following custom, would be called *Dermina*, the name used by Saccardo for the subgenus of *Dermatella* having the spores muriform. Phillips speaks of the spores, "sometimes becoming muriform," but nothing is said about transverse septation, which usually precedes the muriform arrangement.

#### TYMPANIS. Tode. (figs. 45-47, p. 91.)

Ascophores erumpent, becoming superficial, usually in dense clusters and originating from a common stroma, at first closed then expanding, the disc becoming almost or quite plane, somewhat horny, blackish or brown, sometimes powdered with meal outside; excipulum formed of densely interwoven hyphae; asci cylindric-clavate, wall thick, spores hyaline, continuous, very minute, innumerable, in some species eight large spores are present along with the minute ones; paraphyses present.

*Tympanis*, Tode, Fungi Meckl., i. p. 23; Phil., Brit. Disc., p. 351; Rehm, Krypt.-Flora, Disc., p. 264; Sacc., Syll., viii. p. 578.

Growing on branches, bark, &c., usually on living trees. Readily distinguished by the innumerable, minute spores contained in the thick-walled ascus.

*Tympanis conspersa*. Fries, Syst. Myc., ii. p. 175. (figs. 45-47, p. 91.)

Erumpent, 20-40 ascophores densely crowded and origi-



nating from a common stroma, at first closed then expanding and exposing the somewhat depressed disc, which is more or less distinctly marginate; disc circular or irregular from mutual pressure, entirely black, the margin at first powdered with a very little white bloom, which disappears early, not exceeding  $\frac{1}{3}$  mm. across, almost sessile or sub-stipitate or turbinate; excipulum rather corky, composed of very compactly interwoven brown hyphae; asci cylindric-clavate, apex rounded, wall thick, spores innumerable, very minute, continuous,  $1-2 \times .5 \mu$ , with a yellow tinge in the mass; paraphyses numerous, hyaline, about  $1.5 \mu$  thick, apex not thickened; hypothecium brown.

On living bark of birch and poplar.

Specimen in Fries' Scler. Succ., n. 12; accepted as type.

Spermogonia in minute, black, conical conceptacles, usually mixed with the ascophores; spermatia very minute, cylindrical,  $2\frac{1}{2} \times \frac{1}{3} \mu$ , hyaline, continuous.

The present as defined above is the species of Fries, and issued by him in his Scler. Suec., n. 12; Scler. Suec., n. 171, is also the same species. In some of the asci when young, 8 spores are seen, as figured by Phillips in Brit. Disc., pl. xi. fig. 67. The constant features of the present species are, the minute, densely crowded, black ascophores, with only a minute sprinkling of white bloom, or naked from the first, at all events very soon naked; paraphyses entirely colourless, not thickened at the tips.

*Var. mali*, Rehm, Ascom., n. 722.

Ascophores 4-10 seated on a common stroma, disc black,  $\frac{3}{4}$ -1.5 mm. across, the prominent margin remaining permanently powdered with whitish bloom; paraphyses slender, tips thickened up to  $5 \mu$ , brownish.

*Tympanis conspersa*, Phil., Brit. Disc., p. 354; pl. xi. fig. 67; Rehm, Krypt.-Flora, Disc., p. 264; Sacc., Syll., n. 2399.

*Peziza aucupariae*, Pers., Myc. Eur., p. 327.

*Tympanis aucupariae*, Wallr., Flor. Cr. Germ., ii. p. 427; Phil., Brit. Disc., p. 354; Sacc., Syll., viii. n. 2400.

On bark of apple, hawthorn, mountain ash, and other rosaceous plants. Rehm says this species also occurs on *Populus tremula* in Germany.

This variety is also represented in Rab.-Wint., Fung. Eur., n. 3366.



**Tympanis fraxini**, Fr., Syst. Myc., ii. p. 174; Phil., Brit. Disc., p. 355; Rehm, Krypt.-Flora, Disc., p. 266; Sacc., Syll., viii. n. 2408.

Erumpent in small clusters, sometimes solitary, at first clavate and closed, then expanding and becoming turbinate, disc plane, black, shining, margin sometimes slightly wavy, about 1 mm. high and wide, rather horny; excipulum dark brown, parenchymatous, cells minute, indistinct; asci cylindric-clavate, apex rounded, wall thick, spores innumerable, with a faint yellow tinge in the mass, continuous, about  $2.5 \times 1-5 \mu$ ; paraphyses numerous, longer than the asci, very slender and hyaline below, branched, coloured olive-brown, septate, and thickened at the tip to  $6 \mu$ , agglutinated together; hypothecium dark brown.

*Peziza fraxini*, Schweinitz, Syn. Fung. Carol. Sup., in Act. Soc. Nat. Lips., i. p. 129.

On branches of *Fraxinus excelsior*, and other species of ash.

Specimen from Schweinitz, in Herb. Berk., Kew, examined.

The swollen tips of the paraphyses readily break away, and in this condition are described by Phillips.

**Tympanis alnea**, Fries, Syst. Myc., ii. p. 174; Phil., Brit. Disc., p. 355; Rehm, Krypt.-Flora, Disc., p. 268; Sacc., Syll., viii. n. 2415.

Erumpent, caespitose in clusters of 3-15 ascophores springing from a common stroma; at first clavate and closed, then expanding and becoming almost plane, somewhat marginate, narrowed to a very short, stem-like base, blackish-brown, somewhat horny, up to  $\frac{3}{4}$  mm. broad; hypothecium and excipulum yellowish brown, formed of interwoven hyphae, cortex pseudo-parenchymatous, cells small, dark brown; asci cylindrical, apex rounded, base narrowed into a short slender pedicel, wall thick, spores innumerable, minute, smooth, continuous, cylindrical, straight or slightly curved, hyaline but with a tinge of greenish-yellow in the mass,  $2.5-3 \times 1-1.5 \mu$ ; paraphyses numerous, slender, septate, apex thickened, brownish.

*Peziza alnea*, Pers., Syn. Fung., p. 673.

On alder.

Spermogonia intermixed with the above, subconical or

oblong-ovate, opening by a minute pore. Spermatia extremely minute, borne on slender, branched sporophores. (Phil.)

Specimen in Rab., Fung. Eur., n. 719, examined.

**Tympanis ligustri**, Tul., Sel. Fung. Carp., iii. p. 154; Phil., Brit. Disc., p. 353; Rehm, Krypt.-Flora, Disc., p. 271; Sacc., Syll., n. 2406.

Erumpent, ascophores solitary or sometimes in clusters of 2-3; at first closed then expanded and marginate, narrowed below into a very short, stem-like base, blackish, glabrous, somewhat gelatinous then horny,  $\frac{1}{2}$ - $\frac{3}{4}$  mm. across; hypothecium and excipulum brownish, formed of interwoven hyphae, cortex dense, dark brown; asci cylindric-clavate, wall thick, spores innumerable, continuous, subglobose,  $2.5 \times 2 \mu$ , hyaline but with a yellowish green tinge in the mass; paraphyses slender, septate, tip brown and thickened up to  $5 \mu$ .

On privet.

Specimen in Cke., Brit. Fung., exs., ed. ii., n. 461, examined.

Stylospores (conidia?) diplodia-form, borne on filiform sporophores, intermixed with the asci and paraphyses. (Phillips.)

**Tympanis pinastri**, Tul., Sel. Fung. Carp., vol. iii. p. 151, tab. xix. figs. 10-12; Rehm, Krypt.-Flora, Disc., p. 272.

Erumpent, ascophore solitary or in clusters springing from a common stroma, at first closed, then becoming plane and with a more or less prominent margin, black and shining, horny when dry,  $\frac{1}{2}$ -1 mm. across; asci cylindric clavate, thick-walled, spores innumerable, minute, continuous, cylindrical, straight,  $2.5 \times 1 \mu$ , hyaline but with a tinge of yellowish green in the mass; paraphyses slender, septate, thickened at the brown tip.

*Cenangium laricinum*, Fekl., Symb. Myc., p. 270.

**Tympanis laricina**, Phil., Brit. Disc., p. 353; Sacc., Syll., viii. n. 2418.

**Pycnidia**. Subglobose, black, with an apical pore; spermatia long and very slender, curved, escaping in a yellow, gelatinous mass.

On larch bark.

Saccardo considers that Tulasne's fungus is not identical with that of Fuckel.

CRUMENULA. De Not. (figs. 40-44, p. 91.)

Ascophores erumpent, soon becoming quite superficial, globose, mouth circular, margin entire or torn, quite closed when dry; excipulum coriaceous, composed of septate parallel hyphae adhering laterally to form a pseudo-parenchymatous tissue; asci subcylindrical, 8-spored; spores long and very slender, arranged in a parallel fascicle in the ascus; paraphyses present.

*Crumenula*, De Notaris, Prop. di Rett. dei Discom., p. 9; Phil., Brit. Disc., p. 356.

*Godronia*, Rehm, Krypt.-Flora, Disc., p. 237; Sacc., Syll., viii. p. 601.

Distinguished by the subsessile globose ascophores having a small, circular mouth, which contracts and becomes completely closed when dry; and the filiform spores arranged in a parallel fascicle in the ascus.

Growing on the branches of shrubs.

*Crumenula ericae*. Phil., Brit. Disc., p. 357. (figs. 40-44, p. 91.)

Ascophores scattered, erumpent, subglobose, furnished at the base with a very short, thick stem, which is sunk in the matrix, mouth closed when dry, rather coriaceous; disc pale, blackish-brown and rugulose outside, glabrous, about 1 mm. broad and 1.5 high; excipulum formed of parallel, septate, brown hyphae, combined laterally to form a parenchymatous tissue; asci cylindrical, base narrowed, apex rounded and thick-walled; 8-spored; spores needle-shaped, straight or very slightly curved, continuous,  $85-90 \times 1.5 \mu$ , arranged in a parallel fascicle in the ascus, hyaline; paraphyses about  $1.5 \mu$  thick, apex not thickened, hyaline.

*Cenangium ericae*, Fries, Syst. Myc., ii. p. 188.

*Godronia ericae*, Rehm, Krypt.-Flora, Disc., p. 240; Sacc., Syll., viii. n. 2484.

On dead branches of *Calluna vulgaris*.

Pycnidia mixed with, and similar to the ascophores; conidia cylindrical, ends sometimes rather narrowed, strongly curved, hyaline, at length 1-septate,  $14-16 \times 2 \mu$ ; conidiophores subulate, simple,  $10-6 \mu$  long.

Specimen examined in Elv. Brit., exs., n. 194.

**Crumenula urceoliformis.** Karsten, Myc. Fenn., p. 213; Phil., Brit. Disc., p. 356, pl. xi. fig. 68.

Ascophores scattered, erumpent, at first clavate then globose and with a very short, thick stem completely sunk in the matrix; mouth small, closed when dry; disc pale grey; externally blackish, at first with a delicate brown scurf, then naked and vertically furrowed; about 1 mm. across; excipulum formed of parallel, septate, coloured hyphae; asci subcylindrical, apex rounded, base narrowed, 8-spored; spores needle-shaped, continuous, hyaline, straight,  $65-70 \times 2 \mu$ ; paraphyses filiform, often forked but not thickened at the tips.

*Godronia urceoliformis*, Karst., Rev., p. 144; Sacc., Syll., viii. n. 2486.

On stems of *Vaccinium vitis idaea* and *V. uliginosum*.

Pycnidia mixed with, and similar externally to the ascophores; conidia cylindric-oblong, ends narrowed, hyaline, 1-septate, slightly curved or straight.

### *Doubtful species.*

**Crumenula callunigena.** Karsten, Myc. Fenn., p. 212; Phil., Brit. Disc., p. 356.

Ascophores solitary, subglobose, subsessile, mouth small, up to  $\frac{2}{3}$  mm. across; disc pale, externally blackish-brown, naked, somewhat striate; stem very short and thick, springing from a radiating web of dark brown, interwoven hyphae,  $4-5 \mu$  thick; asci cylindrical, narrowed to a slender pedicel, apex somewhat narrowed, 8-spored; spores needle-shaped, ends narrowed, straight, hyaline, continuous at first, then 3-septate,  $40-60 \times 2.5 \mu$ , irregularly 2-seriate; paraphyses crowded, slightly and irregularly thickened at the tip.

*Peziza callunigena*, Karsten, Mon. Pez., 171.

*Godronia callunigena*, Karsten, Rev., p. 144; Sacc., Syll., viii. n. 2485.

On branches of *Calluna vulgaris*.

Differs from *C. ericae* in the shorter, thicker spores, and in the ascophores springing from a subiculum.

I have found this abundantly on decaying branches of *Calluna vulgaris*, and the cups are invariably seated on a blackish-brown tapesium, reminding one of *Tapesia rosea* (Pers.), to which it bears some resemblance (Phillips).

Karsten does not mention the presence of a subiculum, whereas this is a constant feature in the British species, which is supposed by Phillips to be identical with that of Karsten; not having seen specimens from either source, I am unable to form an opinion; the biseriate spores do not coincide with the generic character; and the British species, from every point, requires careful examination.

***Crumenula ledi*.** Karsten, Myc. Fenn., p. 214; Phillips, Brit. Disc., d. 357.

Scattered, superficial, at first clavate and closed, finally opening with a broad mouth, externally rugulose, blackish with a sprinkling of greenish powder, up to  $\frac{2}{3}$  mm. across; asci sub-cylindrical; spores not yet seen; paraphyses numerous, filiform.

*Peziza ledi*, Alb. & Schwein., Consp. Fung. Nisk., p. 343.

*Godronia ledi*, Karsten, Rev. Mon., p. 144; Rehm, Krypt. Flora, Disc., p. 239; Sacc., Syll., viii. n. 2497.

On *Arbutus uva-ursi*.

Sessile, globose-hemispherical; externally rugose, brownish-black; mouth especially shining, greenish; covered with a compact powder; disc dingy. (Phillips.)

An imperfectly known species; in Germany, Switzerland, and Finland, this species is found on *Ledum palustre*, but the spores have never been seen.

### SCHWEINITZIA. Mass.

Ascophores gregarious, but distinct, erumpent, soon becoming superficial, sessile, coriaceous, dark-coloured, externally minutely pulverulent under a lens, due to the cells of

the excipulum running out into densely packed, septate hairs, many of which end in a large coloured cell; asci cylindrical, 8-spored; spores 1-seriate, smooth, continuous, elliptical, coloured; paraphyses slender, thickened upwards.

Distinguished by the large coloured cells terminating the external hairs of the excipulum, and the 1-seriate, continuous coloured spores.

**Schweinitzia phaeospora.** Mass.

Scattered, erumpent, then superficial, sub-sessile, margin at first incurved, then expanding and becoming almost plane when moist, up to 1 mm. across, every part pale brown; rather fleshy, excipulum parenchymatous, cells small, and running out at the margin into densely crowded, parallel, clavate, septate, brown hairs, 6-8  $\mu$  thick at the apex, externally scurfy, due to the presence of numerous large, subglobose, brown cells, up to 30  $\mu$  diameter, that spring from the external cells of the excipulum; asci narrowly clavate, apex rounded; base narrowed into a pedicel, 8-spored; spores obliquely uniseriate, broadly elliptical, smooth, continuous, clear brown at maturity, 10-12  $\times$  8-9  $\mu$ ; paraphyses numerous, linear, apex broadly clavate and brown, 6-8  $\mu$ , passing by degrees into the marginal cells of the epithecium.

*Cenangium phaeosporum*, Cke., Grev., xii. p. 44; Phil., Brit. Disc., p. 346; Sacc., Syll., viii. n. 2354.

On sycamore bark.

Type specimen examined.

**Schweinitzia rufo-olivacea.** Mass.

Ascophore sessile, hemispherical then almost or quite plane, discoid, 1½-2 mm. across, fleshy, firm; externally dingy red, minutely downy and pulverulent, due to the presence of numerous hairs of 3-5 cells each, mixed with large, olive, vesicular, terminal cells springing from the cells of the excipulum; these vesicular olive cells also occur in the substance of the hypothecium; disc plane at maturity, dark olive-green, becoming blackish with age; asci sub-cylindrical, 8-spored: spores obliquely uniseriate, broadly elliptical, ends obtuse, pale olive-brown when mature, smooth, continuous, often 2-guttulate, 10-15  $\times$  7-8  $\mu$ ;



paraphyses numerous, slender, cylindrical, apex slightly thickened and olive-brown.

*Peziza rufo-olivacea*, A. & S., Consp., p. 320, t. 11, fig. 4; Cke., Hdbk., n. 2046.

*Lachnella rufo-olivacea*, Phil., Brit. Disc., p. 275, pl. 8, fig. 49; Sacc., Syll., viii. n. 1639.

*Lachnella fraxinicola*, Phil., Brit. Disc., p. 275; Sacc., Syll., n. .

*Peziza fraxinicola*, B. & Br., Ann. Nat. Hist., n. 1160, t. 4, fig. 21.

On dead branches of rose, bramble, ash, privet, elder, &c.

Scattered; rarely aggregated in groups of 2-3 specimens; recognised by the olive-green, discoid, circular disc. The inflated, brownish-olive, subglobose or pyriform cells, up to 40  $\mu$  in length, present in the substance of hypothecium and projecting from the external cells of the epithecium, are very characteristic. In rare instances I have seen the large vesicular bodies in chains of 2-3 cells. When old the contents of the spores are sometimes divided into two equal portions by a central clear line—spuriously 2-celled—but a transverse septum is not formed. The spores are tinged olive-brown when mature.

I have examined the type specimen of *Lachnella fraxinicola* (B. & Br.), Phil., and find it to be in every respect identical with the present species.

### PHAEANGELLA. Mass.

Ascophore erumpent, soon superficial, closed at first, then expanding and becoming cup-shaped and finally patellate, coriaceous, contracting and becoming contorted when dry; externally furfuraceous; asci 4-8-16-spored; spores elongated, 1-septate, coloured (or in some species hyaline); paraphyses present.

*Phaeangella*, Sacc., Syll., viii. p. 592 (as a section of *Cenangella*).

Distinguished by the usually coloured, 1-septate spores.

### *Phaeangella ulicis*. Mass.

Caespitose or scattered, turbinate and substipitate at first,



then expanding, up to 1.5 mm. across; excipulum composed internally of interwoven hyphae, which towards the periphery become parenchymatous and grouped in irregular cell-groups forming the scurfy exterior, substance brown; disc dark brown, externally paler, ground-coffee colour, scurfy; asci cylindric-clavate, 8-spored; spores 1-seriate, sometimes irregularly 2-seriate above, narrowly elliptic-oblong, smooth, 1-septate, finally brown,  $10-12 \times 4-5 \mu$ ; paraphyses numerous, slender, tips slightly thickened, brownish.

*Dermatea ulicis*, Cooke, Grev., iii. p. 186; Phil., Brit. Disc., p. 339.

*Cenangella* (*Phaeangella*) *ulicis*, Sacc., Syll., viii. n. 2450.

On dead branches of furze (*Ulex*). Type specimen examined.

### **Phaeangella subnitida.** Mass.

Erumpent, gregarious, up to 1 mm. broad, turbinate then flattened, disc marginate and depressed at first, then plane or convex, blackish brown, externally naked; excipulum parenchymatous, cells small; asci clavate, 8-spored; spores irregularly biseriate, narrowly elliptic-oblong, almost sausage-shaped, usually slightly curved, smooth, guttulate, hyaline, then with a brown tinge,  $12-16 \times 4 \mu$ , for a long time continuous then 1-septate; paraphyses very numerous, filiform, septate, about  $2 \mu$  thick, apex not incrassated.

*Cenangium subnitidum*. Cke. & Phil., Grev., vol. iii. p. 186; Phil., Brit. Disc., p. 347; Sacc., Syll., n. 2310.

On dead fallen branches of alder.

Usually densely gregarious.

*Pycnidia*. Scattered or solitary, mixed with the ascophores, conical or hemispherical; stylospores filiform, tips acute, hyaline, curved,  $10-15 \times 1.5 \mu$ .

Type specimen examined.

### **Phaeangella prunastri.** Mass.

Erumpent, caespitose, springing from a common stroma, at first closed and subcylindrical, then expanding, the disc becoming plane or slightly concave, more or less distinctly marginate, blackish, narrowed below into a stem-like base, up to 1 mm., high and broad; excipulum brownish, formed of densely intertwined hyphae; asci clavate, slightly nar-

rowed at the tip, pedicel slender, wall rather thick, 8-spored; spores irregularly 2-seriate above, elliptic oblong, ends obtuse, hyaline, smooth, 1-septate,  $10-15 \times 3.5-4 \mu$ ; paraphyses slender, slightly thickened and brownish at the tips, adhering together.

*Dermatea prunastri*, Fries, Summa Veg. Scand., p. 362; Rehm, Krypt.-Flora, Disc., p. 261.

*Cenangium prunastri*. Fries, Syst. Myc., ii. p. 190; Phil., Brit. Disc., p. 345; Sacc., Syll., viii. n. 2290.

On branches of sloe.

*Pycnidia*. Perithecia spurious, erumpent, 3 mm. high, conico-cylindrical, very fragile, powdery, blackish-brown, terminated by a minute grey globule; spores narrowly fusoid, curved, hyaline, 1-septate,  $15 \times 1.5-2 \mu$ .

*Sphaeronema spurium*, Sacc., Syll., iii. n. 1106.

Specimen in Berk., Brit. Fung., n. 112, examined.

## Fam. V. BULGARIEAE.

Ascophore erumpent or superficial, sessile, base sometimes narrowed and stem-like, discoid and applanate, turbinate, or clavate; glabrous, gelatinous or waxy-gelatinous when growing, rigid and horny when dry; excipulum parenchymatous, or composed of interwoven hyphae; asci cylindrical or rarely many-spored; spores continuous or septate, hyaline or coloured; paraphyses present.

The more or less gelatinous consistency of the excipulum is the most pronounced feature of the present order; when dry it is horny and rigid, becoming again gelatinous when soaked in water. In the larger species, as *Bulgaria*, the ascophore is blackish, in the smaller species usually clear-coloured, orange, red, &c. The asci do not project above the level of the disc, as in the Ascoboleae.

All the species grow on wood, herbaceous stems, or leaves, as saprophytes.

## ANALYSIS OF THE GENERA.

A. *Spores coloured.*

**Bulgaria.** Disc expanding gradually, at length plane and the ascophore turbinate; spores usually only 4 in an ascus.

**Bulgariella.** Disc expanded from the first; ascophore patellate; spores 8 in an ascus.

B. *Spores colourless.*\* *Spores continuous.*

**Ombrophila.** Ascophore stipitate or narrowed into a stem-like base; excipulum composed of interwoven hyphae.

**Orbilina.** Ascophore sessile, attached by a central point, soon plane; excipulum truly parenchymatous.

**Agyrium.** Ascophore sessile, remaining convex.

\*\* *Spores septate.*

**Calloria.** Spores 1-septate.

**Coryne.** Spores 2-many-septate.

## BULGARIA. Fries (emended).

Ascophore more or less gelatinous, erumpent, at first closed, the disc gradually expanding and becoming plane, narrowed below into a short, thick, stem-like base, black or umber-brown, flesh dark; asci narrowly clavate, stipitate, 4-8-spored; spores 1-seriate, continuous, brown; paraphyses slender, the thickened tips bent or curled.

*Bulgaria*, Fries, Syst. Myc., ii. p. 166; Sacc., Syll., viii. p. 636; also of Phil., Brit. Disc., p. 314, in part.

Distinguished by the large, turbinate, fleshy-gelatinous,

blackish ascophore; the narrow, long and slenderly stipitate asci, and the brown, continuous, oblique spores, four of which are only usually present in an ascus.

**Bulgaria polymorpha.** Wettstein, Zool.-Bot. Verh., 1886, p. 595; Rehm, Krypt.-Flora, Disc., p. 495, figs. 1-5, p. 472.

Ascophores gregarious or caespitose, erumpent, at first more or less clavate, closed, rusty-brown, and scurfy, the disc gradually expanding and becoming plane or slightly convex, black and shining, externally umber-brown, wrinkled and scurfy, turbinate and narrowed into a short, stout, stem-like base, which is mostly buried in the substance of the host, 1-4 cm. across, and the same in height; gelatinous, flesh brown; asci cylindric-clavate, narrowed below into a long, slender base, usually only containing four perfectly developed spores; spores 1-seriate, continuous, elliptical, usually slightly curved, 1-2-guttulate, brown at maturity,  $10-14 \times 5-6 \mu$ ; paraphyses slender, slightly thickened, brownish, and more or less curved at the tips.

*Peziza polymorpha*, Oeder, Flor. Dan., t. 464 (1768).

*Peziza inquinans*, Pers., Syn. Fung., p. 631 (1801).

*Bulgaria inquinans*, Phil., Brit. Disc., p. 314, pl. x., fig. 59; Sacc., Syll., viii. n. 2625.

On dead trunks of trees, especially beech.

The fungus bursts through the bark under the form of small rusty-brown, scurfy knobs, which gradually expand at the apex until a plane, black, shining disc is formed. Substance soft and tough, cutting almost like india-rubber.

According to Fuckel—Symb. Myc., p. 286—*Tremella foliacea* (*Ulocolla foliaceae*, Bref., Brit. Fung.-Flora, vol. i. p. 60), is the conidial condition of the present species.

### BULGARIELLA. Karsten. (figs. 8-10, p. 156.)

Ascophore subgelatinous, sessile, discoid, attached by a central point, glabrous, disc plane or convex, open from the earliest stage; black; excipulum composed of interwoven hyphae; asci cylindrical, 8-spored; spores 1-seriate, elliptical, coloured; paraphyses present.

*Bulgariella*, Karsten, Rev. Mon., p. 139; Sacc., Syll., viii. p. 638.

*Bulgaria* of authors.

Distinguished from *Bulgaria* by the disc being open and plane from the earliest stage of development, and not expanding gradually.

***Bulgariella pulla*.** Karsten, Rev., p. 142; Sacc., Syll., viii. n. 2632. (figs. 8–10, p. 156.)

Subgelatinous, sessile, patellate, black, with a tinge of olive, scattered or aggregated in more or less crowded lines, circular when isolated, often irregular from lateral pressure when crowded, 1–2 mm. across, glabrous, blackish inside; asci cylindrical, with a slender pedicel, 8-spored; spores obliquely 1-seriate, continuous, smooth, olive then brown, usually elliptical, ends rather acute, but varying to almost globose,  $10\text{--}15 \times 7\text{--}9 \mu$ ; paraphyses slender, rather wavy, usually containing a single row of blackish granules at the slightly thickened tips.

*Bulgaria pulla*, Fries, Summa Veg. Scand., p. 358; Phil., Brit. Disc., p. 315.

*Patellaria pulla*, Fries, Syst. Myc., ii. p. 160.

On rotten wood.

Resembling a black *Patellaria* in appearance, but distinguished by the gelatinous substance. The blackish granules in the paraphyses become purple when treated with potassic hydrate.

### OMBROPHILA. Fries. (figs. 13, 14, p. 156.)

Ascophore gelatinous when moist, rigid and horny when dry, more or less stipitate; disc plane or convex, rarely concave; excipulum composed of interwoven hyphae; asci cylindrical, apex rounded, base narrowed, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical or elliptic-fusoid; paraphyses present.

*Ombrophila*, Fries, Summa Veg. Scand., p. 357; Phil., Brit. Disc. (in part).

*Peziza* and *Bulgaria* of some authors.

Saprophytic. Distinguished among genera with hyaline, continuous spores, by the stipitate, gelatinous ascophore.

**Ombrophila clavis.** Cke., Grev., viii. p. 84; Phil., Brit. Disc., p. 324, pl. x. fig. 62; Sacc., Syll., viii. n. 2531; Rehm, Disc., p. 478. (figs. 13, 14, p. 156.)

Crowded, gregarious, or scattered, somewhat gelatinous, but rather firm when moist, very variable in form, obconic or pileate and distinctly stipitate, disc plane or convex, stem slender or stout, from  $\frac{1}{4}$ –1 cm. across, entirely pallid or with a more or less decided purple or lilac tinge; excipulum composed of rather loosely interwoven hyphae; asci cylindrical, 8-spored; spores, obliquely 1-seriate, hyaline, smooth, elliptical, ends in some cases obtuse, at others narrowed and almost fusiform,  $10\text{--}16 \times 4\text{--}5 \mu$ ; paraphyses septate, slightly thickened at the tips; hypothecium formed of thin, densely interwoven hyphae.

*Peziza clavis*, A. & S., Comp., p. 306, t. xi. f. 5.

On twigs, leaves, &c., in wet places.

Specimens determined by Berkeley examined, also Rab.-Wint., Fung. Eur., n. 3771.

Very variable in form and size, stem sometimes almost absent, sometimes short and stout, and in rarer cases 1–2 cm. long, and very slender; ascophores sometimes irregularly nodulose, at others symmetrical and almost plane, and altogether resembling a flat-headed nail. Distinguished from small specimens of *Helotium*, &c., by being gelatinous when moist, and by the structure of the excipulum.

**Ombrophila helotioides.** Phil., Grev., vol. xvi. p. 94; Sacc., Syll., viii. n. 2544.

Stipitate, solitary or caespitose, capitulate, pallid, glabrous, subgelatinous; disc convex, margin thin, undulating; stem cylindrical, a little flexuous; asci cylindraceo-clavate; spores 8, narrowly fusiform, straight, or slightly bent, 5-guttulate,  $20\text{--}26 \times 2\text{--}3.5 \mu$ ; paraphyses filiform, hardly thickened at the apices.

On dead stems of *Equisetum* in water. Autumn.

Cup 1–2 lines broad, the whole plant 2–4 lines high, stem  $\frac{1}{4}$  line thick. It differs from *O. clavis* in the spores (Phillips).

Unknown to me.

**Ombrophila rudis.** Phil., Brit. Disc., p. 322; Sacc., Syll., viii. n. 2537.

Subgelatinous when moist; usually tufted, more or less top-shaped, the narrowed base of variable length, when elongated often lacunose or wrinkled; disc almost plane, or unevenly depressed, wrinkled, yellow-brown with a tinge of purple,  $\frac{2}{3}$ –1 $\frac{1}{2}$  cm. high; excipulum composed of interwoven hyphae which are septate and often constricted at the septa, looking like a string of sausages; asci cylindrical, 8-spored, tapering into a long, slender pedicel; spores 1-seriate, hyaline, continuous, smooth, elliptical,  $8\text{--}10 \times 4 \mu$ ; paraphyses very slender, tips scarcely thickened.

*Peziza rudis*, Berk., Proc. Nat. Hist. Soc. Berwick, p. 190.

On gravel and peat.

Type specimen examined.

The stem tapers to the base, and is often crooked, margin of ascophore wavy. Colour paler and spores rather smaller than in *O. sarcoides*.

**Ombrophila brunnea.** Phil., Grev., viii. p. 103; Brit. Disc., p. 323; Sacc., Syll., viii. n. 2551.

Gelatinous when moist; crowded, sessile or narrowed to a more or less evident stem-like base, hemispherical at first, then expanding and often becoming wavy, yellowish-brown, glabrous,  $\frac{1}{2}$ –1 cm. across; excipulum parenchymatous, cortical cells polygonal,  $25\text{--}30 \mu$  diameter; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, continuous, often 2-guttulate and with the contents granular, elliptical,  $18\text{--}21 \times 7\text{--}8 \mu$ ; paraphyses septate, clavate and adhering at the tips; hypothecium minutely parenchymatous.

On dead herbaceous stems in damp places.

Authentic specimens from Phillips examined.

**ORBILIA.** Fries. (figs. 48–51, p. 156.)

Ascophore somewhat gelatinous when moist, horny and pellucid when dry; sessile, attached by a central point, small, at first subglobose, soon becoming plane or slightly concave, superficial, clear coloured, usually red, yellow, or white; excipulum and hypothecium truly parenchymatous, cortical cells large, polygonal; asci cylindric-clavate, 8-spored; spores 1-seriate, hyaline, continuous, varying from



being almost globose to linear and elongated; paraphyses present.

*Orbilina*, Fries, *Summa Veg.*, p. 357; Sacc., *Syll.*, viii. p. 621.

*Calloria*, Phil., *Brit. Disc.* (in part).

Superficially closely resembling *Calloria*, but separated by the continuous spores.

\* *Deep red or flesh-colour.*

***Orbilina Scotica.*** Mass., Grev., vol. xxii. p. 99.

Gregarious, at first subglobose and closed, then expanding and becoming almost plane, with a slight central depression, margin entire, glabrous, thin, almost translucent when moist, irregularly contracted when dry, deep rose-red, sessile and attached by a central point, up to  $\frac{3}{4}$  mm. across; excipulum parenchymatous, cells irregularly polygonal, 5–7  $\mu$  diameter; hypothecium tinged red; asci clavate, apex rounded, base slender and usually crooked, 8-spored; spores irregularly 2-seriate above, 1-seriate below, hyaline continuous, elliptic-oblong, ends obtuse,  $4 \times 1 \mu$ ; paraphyses about 1  $\mu$  thick, tips subglobose.

On rotten wood.

The type specimen is in Herb. Berk., Kew, under the name of *Peziza vinosa* (= *Calloria vinosa*), from which it differs in the very much smaller, differently shaped spores, although superficially the two species closely resemble each other.

Most nearly allied to *Orbilina coccinella*, Karst.; differing in the narrower spores and the much smaller cells of the excipulum.

***Orbilina coccinella.*** Karst., *Myc. Fenn.*, i. p. 98; Rehm, *Krypt.-Flora, Disc.*, p. 453; Sacc., *Syll.*, viii. n. 2586.

Gregarious or often crowded and confluent, thus becoming irregular; sessile, fixed by a central point, thin and subgelatinous, shrinking when dry, blood-red or deep orange-red, pellucid and crimson when dry, 1–2 mm. across; excipulum parenchymatous, cortical cells irregularly polygonal, 15–22  $\mu$  diameter; asci narrowly clavate, pedicel slender and often crooked, 8-spored; spores hyaline, smooth, continuous, egg-

shaped or elliptical,  $3-4 \times 2 \mu$ , 1-seriate; paraphyses slender, knobbed at the tip.

*Peziza coccinella*, Sommerf., Suppl. Flor. Lap., p. 276.

*Calloria coccinella*, Phil., Brit. Disc., p. 328.

On dead wood and bark. Rehm states that it also occurs on crustose lichens and on species of *Polyporus*.

Specimen in Rehm's Ascom., n. 71A, B, examined.

Distinguished from *O. leucostigma* by the deep red colour of the ascophore, and the broader spores.

**Orbilia rubella.** Karst., Myc. Fenn., i. p. 102; Rehm, Krypt.-Flora, Disc., p. 458; Sacc., Syll., viii. n. 2561.

Gregarious, thin, subgelatinous, sessile, at first subglobose and close, then becoming almost or quite plane; margin wavy, very minutely velvety, deep red, somewhat contracted and irregular when dry,  $1-1\frac{1}{2}$  mm. across; excipulum parenchymatous, cortical cells irregular,  $8-10 \mu$  diameter, running out into obtuse, thin-walled hyphae at the margin,  $30-40 \times 5-6 \mu$ ; these hyphae are sometimes slightly curved and thickened at the tip, and give the velvety appearance to the margin; asci cylindric-clavate, 8-spored; spores obliquely 1-seriate or 2-seriate above, hyaline, continuous, very slender, apex rounded, base acute,  $8-12 \times 1 \mu$ ; paraphyses slender, tip not thickened.

*Peziza rubella*, Pers., Syn. Fung., p. 365.

*Calloria rubella*, Phil., Brit. Disc., p. 334.

On bark and wood.

Specimen examined in Karsten's Fung. Fenn., n. 834.

**Orbilia vinosa.** Karsten, Myc. Fenn., i. p. 101; Rehm, Krypt.-Flora, Disc., p. 457; Sacc., Syll., viii. n. 2562.

Usually scattered, sessile, attached by a central point, at first closed, soon opening and becoming applanate, plane or very slightly concave, thin and subgelatinous, pale vinous red or flesh colour, not changing much in form or colour when dry,  $\frac{1}{2}-1$  mm. across; excipulum minutely parenchymatous, cells of cortex polygonal or irregular,  $5-8 \mu$  diameter; asci cylindric-clavate, 8-spored; spores 2-seriate, smooth, hyaline, continuous, very narrowly fusiform, widest part usually above the middle, ends acute, straight or curved,  $14-17 \times 2 \mu$ ; paraphyses very slender, sometimes branched, more or less thickened at the tip, hyaline.

*Peziza vinosa*, Alb. & Schw., Comp. Fung. Nisk., p. 308.

*Calloria vinosa*, Phil., Brit. Disc., p. 333, pl. x., fig. 63.

On dead wood, bark, branches, &c.

Specimen in Rehm's Ascom. n. 17, examined.

Distinguished by the pale red wine-colour of the ascophore, the very slender, long, fusiform spores, and the small size of the cells of the excipulum and cortex.

**Orbilia rubicola.** Sacc., Syll., viii. n. 2565.

Gregarious, sessile, applanate, reddish flesh-colour, glabrous; margin prominent, rather obtuse; asci clavate; spores 8, fusiform,  $9-11 \times 1 \mu$ ; paraphyses slenderly filiform.

*Colloria rubicola*, Cke. & Phil., Brit. Disc., p. 331.

On *Rubus caesius*.

Cups  $\frac{1}{4}-\frac{2}{4}$  of a line broad. This is very similar to *Peziza vinosa*, but differs in the spores. (Cke. & Phil.)

No specimen examined.

\*\* Whitish, yellow, or orange.

**Orbilia flexuosa.** Crossland, Grev., v. 22, p. 41.

Ascophore 1-2 mm. across, sessile, concave then more or less plane; margin slightly raised, usually more or less lobed and flexuous, sometimes even, composed of narrowly clavate, parallel, closely septate hyphae; every part at first pale then reddish amber, glabrous; cells of excipulum small; asci cylindrical, narrowed towards the base; spores 8, uniseriate, elliptic-fusiform, usually bi-guttulate, smooth, hyaline,  $8-10 \times 4-5 \mu$ ; paraphyses numerous, filiform, very slightly or not at all thickened at the apex, which is tinged orange.

Gregarious; on decaying bark.

Almost horny when dry; sometimes plane and the margin even; some specimens become almost black when old and dry.

**Orbilia lasia.** Sacc., Syll., viii. n. 2574.

Ascophore erumpent, sessile, at first closed and globose, then expanding and becoming saucer-shaped, margin irregularly fimbriate, pale, the remainder orange, 1-2 mm. across, fleshy, somewhat gelatinous when moist; excipulum parenchymatous, cells irregularly polygonal, becoming long and

narrow near the margin, and finally running out into thin-walled, septate, hyaline hairs,  $25-50 \times 5-6 \mu$ , which form the irregular margin; many of the external cells of the excipulum also run out into short, obtuse hairs; asci narrowly clavate, pedicel long, slender, crooked, 8-spored; spores irregularly 2-seriate, hyaline, continuous, cylindric-fusiform,  $12-15 \times 2-2.5 \mu$ ; paraphyses about  $1 \mu$  thick, tip fusiform, apex acute, the thickened apical portion  $10-12 \times 4-5 \mu$ , sometimes with a median septum, hyaline.

*Peziza lasia*, B. & Br., Ann. Nat. Hist., n. 1391, ser. 4, vol. ii. p. 347, t. viii., fig. 10 (1873).

*Calloria lasia*, Phil., Brit. Disc., p. 327.

On bark and wood of elm.

Type specimen examined, also specimens in Phil., Elv. Brit., n. 117, and Rabenh., Fung. Eur., nov. ed., n. 1515.

A well-marked species, characterised by the large lance-shaped or fusiform tips of the paraphyses, which are acute at the apex. The amount of down on the exterior of the excipulum varies considerably; sometimes it surrounds the base of the ascophore, as in *O. auricolor*.

**Orbilbia leucostigma.** Fries, Summa Veg. Scand., p. 357; Sacc., Syll., viii. n. 2591.

Gregarious or scattered, sessile, fixed by a central point, at first closed then expanding and becoming more or less plane, often with a central dimple; thin, whitish, and translucent when moist, becoming slightly raised and incurved at the margin, rigid and yellowish when dry,  $\frac{1}{2}$ -1 mm. across; excipulum parenchymatous, cortical cells subquadrate, slightly elongated radially, becoming smaller towards the entire margin; asci narrowly clavate, 8-spored; spores hyaline, continuous, smooth, elliptical,  $3-4 \times 1.5 \mu$ , 1-seriate; paraphyses very slender, tip abruptly almost globose,  $3-4 \mu$  broad.

*Peziza leucostigma*, Fries, Obs. Myc., i. p. 165.

*Calloria leucostigma*, Phil., Brit. Disc., p. 330.

On dead wood and bark.

Specimen determined by Berkeley examined.

When examined under a pocket-lens resembles *O. inflatula* and *O. luteo-rubella*; differs from the former in the knobbed paraphyses, and from the latter in the smaller spores.

*Var. xanthostigma*, Rehm, Krypt.-Flor., Disc., p. 455.

Differs from the typical form only in being yellow, sometimes also with a tinge of red when fresh.

*Peziza xanthostigma*, Fries, Obs. Myc., i. p. 166.

*Orbilia xanthostigma*, Fries, Summa Veg. Scand., p. 357; Sacc., Syll., viii. n. 2592.

*Calloria xanthostigma*, Phil., Brit. Disc., p. 329.

On dead wood.

Specimen in Phil., Elv. Brit., n. 130, examined.

Scarcely worthy of being considered a true variety, transitions as to colour being not unknown. Rehm says the spores are clavate-elliptic.

***Orbilia Leightoni*.** Sacc., Syll., viii. n. 2600.

Scattered, minute, sessile, hemispherical, then slightly concave; margin incurved; exterior glabrous, very pale yellow; hymenium same colour; asci clavate; spores 8, oblong-elliptic,  $8 \times 3 \mu$ ; paraphyses slenderly filiform.

*Calloria Leightoni*, Phil., Brit. Disc., p. 329.

On *Polyporus*.

Cups  $\frac{1}{2}$ –1 line broad. The colour varies from white to very pale yellow; sometimes diaphanous. The spores are considerably larger than *Peziza epipora*, Nyl. (Phil.)

Unknown to me.

***Orbilia auricolor*.** Sacc., Syll., viii. n. 2575. (figs. 45–47, p. 156.)

Gregarious or sometimes confluent, sessile, subgelatinous, closed at first and almost globose, then becoming plane with a blunt, glabrous, upraised margin, surrounded by a delicate web of hyaline, septate, branched hyphae, which spring from the basal cortical cells, clear orange,  $\frac{2}{3}$ –1½ mm. across; dingy orange, but almost unchanged in form when dry; hypothecium and excipulum truly parenchymatous, cells large, cortical cells irregular in form and size, up to  $20 \mu$  across, becoming smaller towards the entire margin; asci narrowly clavate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, straight,  $5\text{--}6 \times 1.5 \mu$ ; paraphyses numerous, cylindrical,  $2.5 \mu$  thick, slightly flattened and broadened like the head of a nail at the extreme tip.

*Peziza auricolor*, Bloxam, MS., in B. & Br., notices of

British Fungi, n. 1068, in Ann. Nat. Hist., vol. xv. p. 16 (1865).

*Calloria auricolor*, Phil., Brit. Disc., p. 334.

On dead bark and wood.

Type specimen examined.

Distinguished by the ascophore being seated upon a white mycelium.

***Orbilia luteo-rubella*.** Karsten, Myc. Fenn., p. 101; Sacc., Syll., viii. n. 2573; Rehm, Krypt.-Flora, Disc., p. 455.

Scattered, sessile, fixed by a central point, closed at first then becoming almost or quite plane, thin, subgelatinous, reddish- or brownish-yellow, when dry the colour is dingy yellowish-red, slightly depressed but the margin not raised nor incurved,  $\frac{1}{4}$ – $1\frac{1}{2}$  mm. across; excipulum parenchymatous, cortical cells polygonal or subcircular, 15–22  $\mu$  diameter; asci narrowly clavate, pedicel slender, often crooked, 8-spored; spores irregularly 2-seriate above, hyaline, continuous, fusiform, ends acute, straight,  $6\text{--}10 \times 1\cdot5 \mu$ ; paraphyses slender, knobbed at the tip, which is 4–5  $\mu$  across.

*Peziza luteo-rubella*, Nylander, Pez. Fenn., p. 55.

*Calloria luteo-rubella*, Phil., Brit. Disc., p. 333.

On dead bark, wood; also on dead *Polyporus*.

Specimen in Karsten, Fung. Fenn., n. 727 examined; also Phillips, Elv. Brit., n. 185.

Differs from *O. leucostigma*, its nearest ally, in the longer, fusiform spores.

***Orbilia inflatula*.** Karst., Myc. Fenn., p. 100; Sacc., Syll., n. 2583. (figs. 48–51, p. 156.)

(Ups gregarious, substance thin, translucent, watery, whitish with a tinge of yellowish green, slightly depressed or almost plane, sessile or sometimes produced into a very short stem-like base furnished with white down, 1–1.5 mm. across, when dry the margin is raised and angularly contracted, ochraceous or with a reddish tinge; asci cylindric-clavate, obtuse, spores 8, irregularly biserial, filiform,  $6\text{--}10 \times \cdot5 \mu$ ; paraphyses absent.)

*Peziza inflatula*, Karst., Mon. Pez., p. 175.

*Calloria inflatula*, Phil., Brit. Disc., p. 335.



On rotten wood, branches, inside bark, &c. Distinguished from allies by absences of paraphyses, and in the margin ascending and becoming angularly contracted when dry.

**AGYRIUM.** Fries. (figs. 34-35, p. 12.)

Ascophore erumpent, roundish or elongated, sessile, convex, immarginate, excipulum almost absent; somewhat gelatinous when moist, hard or horny when dry, smooth, even; asci clavate, spores 8, continuous, hyaline; paraphyses present; hypothecium colourless.

*Agyrium*, Fries, Syst. Myc., ii. p. 231; Sacc., Syll., vol. viii. p. 634; Rehm, Krypt.-Flor., Discom., p. 450; Leighton, Lich.-Flora of Gt. Brit., p. 392; Cke., Hdbk., p. 733.

The present genus is placed by Rehm in the *Bulgariaceae*, on account of being more or less gelatinous when moist. Leighton and some other lichenologists consider it as being a lichen, probably influenced by respect for tradition, as there is no trace of a thallus, hence gonidia, the one and only distinctive feature of lichen-fungi, are entirely absent.

***Agyrium rufum.*** Fries, Syst. Myc., ii. p. 231; Sacc., Syll., n. 2615; Leight., Lich.-Flora, p. 392; Cke., Hdbk., p. 733. (figs. 34, 35, p. 12.)

Ascophore roundish or elongated,  $\frac{1}{2}$ –1 mm. long, erumpent, sessile; very convex, almost hemispherical, rather gelatinous, and reddish-brown when moist, becoming more or less collapsed at the centre and horny when dry, excipulum obsolete; asci clavate; spores 8, biseriate, elliptical, hyaline, continuous, smooth, usually 1-guttulate,  $10-15 \times 6-8 \mu$ ; paraphyses branched, septate, apices slightly thickened and brown, agglutinated together, a little longer than the asci; hypothecium colourless.

On old weathered wood.

Resembling some minute *Tubercularia* in habit. Smooth, even, often surrounded at the base by a narrow white zone.

**Var. *pallens*,** Fries, l.c., p. 232; convex and pallid when moist, yellowish when dry; often seated on a whitish spot.

Specimen in Fries' "*Scleromycetes Sacciae*," Exsicc., n. 280, examined.



## CALLORIA. Fries.

Ascophore somewhat gelatinous when moist, horny and more or less pellucid when dry, small, subglobose at first, soon becoming plane, sessile and fixed by a central point, superficial or erumpent and becoming superficial, glabrous, bright coloured; asci cylindric-clavate, 8-spored; spores 1-seriate, hyaline, elongated, 1-septate; paraphyses present.

*Calloria*, Fries, *Summa Veg.*, p. 359; *Sacc.*, *Syll.*, viii. p. 639; *Phil.*, *Brit. Disc.* in part.

Superficially resembling *Orbilia*, but distinguished by the septate spores.

*Calloria fusarioides*. Fries, *Summa Veg. Scand.*, p. 359; *Phil.*, *Brit. Disc.*, p. 331; *Rehm*, *Krypt.-Flora*, *Disc.*, p. 463, figs. 1-3, p. 448; *Sacc.*, *Syll.*, viii. n. 2634.

Gregarious or sometimes confluent and forming irregular patches, sessile, developing beneath the epidermis, which is finally ruptured, at first globose and closed, then expanding and becoming slightly concave or almost plane, glabrous, orange-red, subgelatinous when moist,  $\frac{1}{2}$ - $1\frac{1}{2}$  mm. across; excipulum delicately and minutely parenchymatous, the cells becoming narrow and elongated to form the margin; asci clavate, apex rounded, base slender, usually crooked, 8-spored; spores irregularly 2-seriate, smooth, hyaline, narrowly elliptic-oblong, at first continuous then 1-septate, sometimes becoming 3-septate,  $10-15 \times 3-3.5 \mu$ ; paraphyses numerous, hyaline,  $2 \mu$  thick, tip slightly thickened.

*Peziza fusarioides*, Berk., *Mag. Zool. & Bot.*, vol. i. p. 46, t. ii. fig. 4 (1837).

On dead nettle stems.

*Conidial form*. Gregarious, irregularly circular, becoming collapsed in the centre, bright orange-red; conidiophores repeatedly forked, elongated; conidia terminal on the branchlets, cylindrical,  $8-12 \times 1.5 \mu$ , continuous, hyaline.

*Cylindrocolla urticae*, Bonorden, *Hdbk.*, p. 149; *Sacc.*, *Syll.*, iv. n. 3190; *Brit. Fung.-Flora*, iii. p. 472, fig. 25, p. 442.

On dead nettle stems.

Superficially resembling the ascigerous stage; subgelatinous when moist.

Type specimen examined; also Berk., *Brit. Fung.*, n. 67;

Cooke, Fung. Brit., n. 343, & ed. ii. n. 381; Phil., Elv. Brit., n. 82; Rehm, Ascom., n. 72.

**Calloria cornea.** Phil., Brit. Disc., p. 332; Sacc., Syll., viii. n. 2639.

Gregarious, sessile, at first globose or slightly narrowed at the base and closed, then expanding and becoming only slightly concave or sometimes plane, margin very minutely irregular, at first pale horn-colour, becoming rich yellow-brown with age, blackish and horny when dry,  $\frac{1}{2}$ – $\frac{1}{2}$  mm. across; cortex parenchymatous, cells irregularly polygonal, 6–8  $\mu$  diameter; asci clavate, apex slightly narrowed, pedicel stout, often bent, 8-spored; spores irregularly 2-seriate above, hyaline, smooth, narrowly elliptic-fusiform, ends rather acute, usually slightly bent, 1-septate at maturity,  $14\text{--}15 \times 3\text{--}3.5 \mu$ ; paraphyses numerous, often branched, tips clavate, yellow-brown, more or less agglutinated together.

*Peziza cornea*, B. & Br., Ann. Nat. Hist., n. 578, vol. vii. p. 16.

On dead stalks of *Carex paniculata*.

Type specimen examined.

**Calloria conicicola.** Cke. & Phil., Brit. Disc., p. 333; Sacc., Syll., viii. n. 2637.

Gregarious or crowded, very minute, sessile, subgelatinous, globose and closed at first, then expanding, the entire margin remaining slightly upraised, flesh-red or orange-red, about  $\frac{1}{4}$  mm. across; more or less closed or contracted when dry; excipulum parenchymatous, cells small, cortical cells irregularly polygonal, 6–9  $\mu$  diameter; asci cylindric-clavate, apex narrowed, pedicel stout, 8-spored; spores obliquely 2-seriate, smooth hyaline, for a long time continuous, finally 1-septate, narrowly elliptical, ends acute, often slightly curved,  $12\text{--}14 \times 2.5 \mu$ ; paraphyses hyaline, cylindrical, about 2  $\mu$  thick, not thickened at the tip.

On the dead stem of hemlock (*Conium maculatum*).

Type specimen examined.

A minute species, gregarious or often densely crowded, nestling in the fine striae of the dead stem of hemlock, probably also on other umbellifers. Spores large for the size of the plant.

## CORYNE. Tul. (figs. 4-7, p. 156.)

Ascophore fleshy-gelatinous, sessile or narrowed below into a short, stem-like base, globose at first then becoming turbinate, disc plane or sometimes slightly convex; glabrous; asci cylindric-clavate, 8 spored; spores hyaline, at length 2-many-septate; paraphyses present.

*Coryne*, Tulasne, Carp., iii. p. 190; emended by Saccardo in Consp. Gen. Disc., p. 10; Sacc., Syll., viii. p. 641.

*Ombrophila*, Phil., Brit. Disc. in part.

Distinguished from *Ombrophila*, its nearest ally, by the septate spores.

***Coryne urnalis*.** Sacc., Fung. Ven., ser. iv., n. 69; Sacc. Syll., viii. n. 2648.

Clustered, sessile or contracted into a short stem-like base, when moist subgelatinous, but firm, margin at first incurved, then expanded and wavy, the disc becoming plane, often wrinkled from the base on the outside,  $\frac{1}{2}$ – $1\frac{1}{2}$  cm. across; entirely flesh-red, sometimes with a tinge of purple; hypothecium composed of colourless, densely interwoven hyphae, which pass abruptly into a broad, coloured, cortical zone of parenchyma, cells polygonal, 8–10  $\mu$  diameter; asci narrowly cylindrical with a long, narrow pedicel, tip somewhat truncate, 8-spored; spores obliquely 2-seriate above, narrowly elliptic fusoid, hyaline, contents granular, for a long time continuous, then 3–5 septate,  $25\text{--}30 \times 6\text{--}7 \mu$ ; paraphyses slender, tips slightly thickened; hypothecium of thin, densely interwoven hyphae.

*Bulgaria urnalis*, Nyl., Obs., p. 73 (in note).

*Ombrophila urnalis*, Karsten, Myc. Fenn., i. p. 87.

*Ombrophila purpurea*, Fekl., Symb. Myc., p. 284; Phil., Brit. Disc., p. 324.

*Coryne sarcoides*, Tul., var. *urnalis*, Rehm, Kr.-Fl., Disc., p. 490.

On rotten trunks, stumps, &c.

Specimens examined in Cooke's Fung. Brit., ed. ii. n. 685, and in Johs. Kunze, Fung. Sel., Exs., n. 193.

Superficially resembling *C. sarcoides*, but distinguished by the larger spores.

*Coryne atrovirens*. Sacc., Syll., viii. n. 2645; Rehm, Krypt.-Flora, Disc., p. 485. (figs. 4-7, p. 156.)

Crowded or scattered, somewhat gelatinous but firm, at first globose and closed, then expanded and more or less plane, sessile or with a very short, thick stem,  $\frac{1}{2}$ -2 mm. across, dingy green, blackish and horny when dry; asci cylindric-clavate, apex rounded and thick-walled, 8-spored; spores irregularly biseriate above, or sometimes almost 1-seriate, long and narrowly cylindrical or cylindric-fusoid, ends rather blunt, straight or rarely slightly curved, 3-5-septate, smooth, hyaline,  $15-21 \times 4-5 \mu$ ; paraphyses numerous, very slender, branched, tips slightly thickened and greenish, rather longer than the asci; hypothecium greenish yellow.

*Peziza atrovirens*, Pers., Syn. Fung., p. 635.

*Ombrophila atrovirens*, Phil., Brit. Disc., p. 325.

*Conidial stage*. Minute, subgelatinous, pulvinate, dingy green, conidiophores very crowded, filiform, branched, bearing hyaline, continuous conidia,  $1\frac{1}{2} \times \frac{1}{2} \mu$  at the tips of the branches.

On rotting wood, branches, &c., in damp places.

Specimens examined in Phil., Elv. Brit., n. 141, and Rehm, Ascom., n. 618.

Small, discoid, looking like the apothecia of some *Lecidea*, distinctly gelatinous when moist. In some specimens the asci are clavate, wall very thick at the apex, and entirely filled with minute hyaline, continuous spores  $1\frac{1}{2} \times 1 \mu$ , thus agreeing with the asci in the genus *Tympanis*; at a later stage the eight spores, as described above, appear in the asci containing the minute spores. This condition of things is shown in the specimens in both exsiccati quoted above. In other cases the minute spores appear to be absent, or their presence may depend on relative age. The matter requires to be worked out from living material.

## Fam. VI. ASCOBOLEAE.

Ascophore sessile, sometimes narrowed to a very short stem-like base, fleshy or subgelatinous; disc plane or convex, and rough with the projecting tips of the asci at maturity; excipulum parenchymatous, cortical cells large, irregularly polygonal; asci usually broadly clavate, dehiscing by an apical operculum, 8-many-spored; spores continuous, elongated, rarely globose, hyaline or coloured; paraphyses present.

For the most part growing on old dung of animals in shady places; sometimes on earth or decaying vegetable matter.

The soft, fleshy, subgelatinous texture; the papillate hymenium, arising from the protruding asci, which are always broadly clavate; or the growth of nearly all species on the dung of animals, are ready characters by which to distinguish the plants of this order from *Pezizae*. They rarely exceed 2 lines in breadth, the majority being much less. (Phillips.)

The members of the present group rank among the most beautiful and interesting of the Discomycetes, and at the same time it is certain that they are more imperfectly known than those of any other family. The reason of this is on account of the extreme delicacy and minuteness of most species, many being practically nothing more than a semi-liquid point of jelly in consistency, and unless all the details are drawn up from the living specimen the diagnosis is certain to be more or less imperfect. To those who have the opportunity, the present group offers an opportunity for adding vastly to our knowledge of these beautiful organisms. Boudier's beautifully illustrated monograph of the *Ascoboleae* would be indispensable in contemplating a serious and detailed study of the group.



## : FIGURES ILLUSTRATING THE ASCOBOLEAE, &amp;c.

Fig. 1, *Dasyscypha ciliaris*, Sacc., plants  $\times$ ;—Fig. 2, section of portion of ascophore of same;  $\times 300$ ;—Fig. 3, *Curreyella trachycarpa*, Mass., ascus and paraphysis;  $\times 300$ ;—Fig. 4, *Coryne atrovirens*, Sacc., group of plants; nat. size;—Fig. 5, ascus and paraphysis; highly  $\times$ ;—Fig. 6, spores of same;  $\times 300$ ;—Fig. 7, branched conidiophore with conidia, from conidial stage of same;  $\times 300$ ;—Fig. 8, *Bulgariella pulla*, Fries, plants; nat. size;—Fig. 9, ascus and paraphyses of same; highly  $\times$ ;—Fig. 10, spores of same;  $\times 300$ ;—Fig. 11, *Saccobolus Kerverni*, Boud.; ascus and paraphysis;  $\times 300$ ;—Fig. 12, *Dasyscypha Soppittii*, Mass., ascus and paraphyses;  $\times 300$ ;—Fig. 13, *Ombrophila clavus*, Phil.; nat. size;—Fig. 14, ascus and paraphyses of same;  $\times 300$ ;—Fig. 15, *Stamnaria equiseti*, Sacc., plants on dead stem of *Equisetum*; nat. size;—Fig. 16, plant of same;  $\times$ ;—Fig. 17, spores of same;  $\times 300$ ;—Fig. 18, *Mollisia atrocineria*, Phil.; nat. size;—Fig. 19, portion of excipulum and margin of same; highly  $\times$ ;—Fig. 20, two plants of same;  $\times$ ;—Fig. 21, section of same;  $\times$ ;—Fig. 22, ascus of same; highly  $\times$ ;—Fig. 23, spores of same;  $\times 300$ ;—Fig. 24, *Dasyscypha carinata*, C. & M.; nat. size;—Fig. 25, the same;  $\times$ ;—Fig. 26, *Phialea emergens*, Mass.; nat. size;—Fig. 27, same;  $\times$ ;—Fig. 28, section of same;  $\times$ ;—Fig. 29, ascus and paraphysis of same;  $\times 300$ ;—Fig. 30, *Belonidium pullum*, Phil. & Keith, specimens on sheath of grass; nat. size;—Fig. 31, portion of cortex and margin of same, outside surface view; highly  $\times$ ;—Fig. 32, ascus and paraphysis of same; highly  $\times$ ;—Fig. 33, spores of same;  $\times 300$ ;—Fig. 34, *Ryparobius Cookei*, Boudier, asci and paraphysis;  $\times 300$ ;—Fig. 35, apex of ascus, showing dehiscence by the opening of a circular lid;  $\times 300$ ;—Fig. 36, *Ascophanus minutissimus*, Boud.; nat. size;—Fig. 37, ascus and paraphyses of same;  $\times 300$ ;—Fig. 38, *Ryparobius Pelletieri*, Sacc., ascus and paraphysis; highly  $\times$ ;—Fig. 39, *Tapesia caesia*, Fckl., portion of a broadly effused subiculum with numerous ascophores; nat. size;—Fig. 40, ascus and paraphysis of same;  $\times 300$ ;—Fig. 41, *Chlorosplonium aeruginosum*, Tul.; nat. size;—Fig. 42, spores of same;  $\times 300$ ;—Fig. 43, *Pseudopeziza retrusa*, Mass., two ascophores bursting through the substance of a pine leaf;  $\times$ ;—Fig. 44, ascus of same;  $\times 300$ ;—Fig. 45, *Orbilbia auricolor*, Sacc.; nat. size;—Fig. 46, same, showing the white hyphae surrounding the base of the ascophore;  $\times$ ;—Fig. 47, ascus and paraphyses of same;  $\times 300$ ;—Fig. 48, *Orbilbia inflatula*, Karst., two ascophores;  $\times$ ;—Fig. 49, an ascophore of the same, in the dry state;  $\times$ ;—Fig. 50, section of same;  $\times$ ;—Fig. 51, ascus of same;  $\times 300$ .

(Fig. 41, at bottom of plate, should be fig. 39.)



## ANALYSIS OF THE GENERA.

A. *Spores coloured.*

**Ascobolus.** Spores free in the ascus.

**Saccobolus.** Spores contained within a special membrane in the ascus.

B. *Spores hyaline.*\* *Spores globosé.*

**Cubonia.**

\*\* *Spores elliptical.*

**Ascophanus.** Ascus 8-spored.

**Ryparobius.** Ascus 16-many-spored.

## ASCOBOLUS. Pers. (emended).

Ascophore sessile or narrowed below into a very short stem-like base, usually gregarious, rather fleshy, soft, and translucent when fresh, closed at first, then expanding, the disc becoming plane or slightly convex, at length studded with the tips of the projecting asci; excipulum parenchymatous, cells of cortex polygonal, large, glabrous or pilose; asci clavate, 8-spored; spores irregularly 2-seriate, elliptical, continuous, at first hyaline, then purple, finally brown, epispore usually rugulose at maturity; paraphyses present.

*Ascobolus*, Persoon, in Gmel., Syst., p. 1461 (in part); Phil., Brit. Disc., p. 286; Sacc., Syll., viii. p. 514.

Most of the species grow on dung; a few grow on the ground, on charcoal, &c.

Distinguished by the 8 elliptical, coloured spores being free in the ascus. It must be remembered that the spores are in all the species, hyaline and smooth when young.

\* *Externally glabrous.*

**Ascobolus denudatus.** Fries, Syst. Myc., ii. p. 154; Boud., Ascob., p. 26, t. 5, fig. 3; Phil., Brit. Disc., p. 287; Sacc., Syll., viii. n. 2164.

Ascophores gregarious, narrowed below into a short, stem-like base, disc closed at first, afterwards becoming plane, externally smooth, altogether dull yellowish green, becoming brownish and irregularly contracted when dry, 1–2 mm. across; hypothecium consisting of minute, very delicate parenchymatous tissue, excipulum parenchymatous, cortical cells 18–25  $\mu$  diameter; asci large, clavate, slenderly stipitate, 8-spored; spores at first 1-seriate, then becoming more or less irregularly 2-seriate above, elliptical, at first hyaline, then violet, finally brown, marked with very delicate, more or less anastomosing lines, 15–18  $\times$  7–8  $\mu$ ; paraphyses very slender, septate, sometimes branched.

On naked ground and on pine saw-dust.

Specimens in Sydow's Myc. March., n. 786, and Rehm's Ascom., n. 823, examined.

**Ascobolus asininus.** Cke. & Mass., Grev., vol. xxi., p. 72.

Scattered or gregarious, hemispherical or subdepressed, watery, fleshy, at first umbilicate, then open, with a thick margin, indistinctly rugulose, pale olive-green or amber, or a combination of both colours, 1–2 mm. across; hypothecium and excipulum parenchymatous, cortical cells large, polygonal or nearly spherical; asci broadly clavate, 8-spored; spores irregularly 2-seriate, elliptical, ends obtuse, 40–45  $\times$  21–23  $\mu$ , at first hyaline, then reddish-brown, epispore thick, finally cracked into subhexagonal, minute areolae; paraphyses very long, slender, wavy, septate, hyaline, much longer than the asci.

On asses' dung.

Type specimen examined.

Somewhat gelatinous and translucent when growing. Distinguished by the large spores and pale colour of the ascophore.

**Ascobolus vinosus.** Berk., Engl. Flora, vol. v. p. 209; Phil., Brit. Disc., p. 288; Sacc., Syll., viii. n. 2147.

Ascophores scattered, sessile, at first globose then expanding, the disc becoming slightly concave, margin minutely crenulate, externally glabrous, dull purple, 1-2 mm. across; excipulum parenchymatous, cortical cells large, polygonal, tinged purple; asci clavate, base narrowed into a slender pedicel, 8-spored; spores irregularly 2-seriate, elliptical, at first hyaline, then purple, finally brown, epispore with more or less longitudinal, anastomosing wrinkles,  $21-23 \times 10-12 \mu$ ; paraphyses hyaline, slender, septate, slightly longer than the asci, involved in mucus.

On rabbit dung. Also said to have been met with on cow-dung.

Type specimen examined.

**Ascobolus glaber.** Pers. Obs., i. p. 34, t. 4, fig. 7; Phil., Brit. Disc., p. 288; Sacc., Syll., viii. n. 2144.

Ascophores crowded or rarely scattered, sessile, but more or less narrowed towards the base and of a pyriform or obconic form, disc becoming plane or even slightly convex; glabrous and almost translucent when fresh, up to 1 mm. across, usually tawny-brown, but sometimes whitish, or with a reddish-purple tinge; excipulum parenchymatous, cortical cells polygonal,  $18-25 \mu$  diameter; asci broadly clavate, base rather stout, crooked, 8-spored; spores irregularly 2-seriate, elliptical, ends obtuse, hyaline then deep violet, more or less longitudinally wrinkled, the wrinkles running into each other,  $25-28 \times 12-14 \mu$ ; paraphyses septate, rather stout, hyaline, tips not thickened, longer than the asci.

On dung of cow, horse, rabbit, &c.

Specimen in Phillips' Elv. Brit., n. 96, examined.

Ascophores about  $\frac{1}{4}-\frac{1}{2}$  line broad; they are decidedly pyriform when removed from the matrix. The convex disc is covered with black papillae, which are the summits of the asci, containing the black spores. (Phil.)

**Ascobolus aerugineus.** Fr., Obs., ii. p. 310; Boud. Ascob., p. 32, pl. 7, fig. 72; Phil., Brit. Disc., p. 287.

Ascophores gregarious, sessile, globose or subcylindrical and closed when young, then expanding until the disc is almost or quite plane, and somewhat marginate, and studded with black points, externally glabrous; yellowish green,

then olive, somewhat pellucid, becoming blackish olive when old and dry,  $\frac{1}{2}$ –1 mm. across, excipulum parenchymatous, cortical cells, polygonal, large; asci clavate, narrowed below into a slender pedicel, 8-spored; spores at first almost 1-seriate, then irregularly 2-seriate, rather narrowly elliptical, violet then violet-brown or altogether brown, epispore with irregularly anastomosing wrinkles,  $16\text{--}18 \times 7\text{--}8 \mu$ ; paraphyses septate, becoming slightly and gradually thickened upwards, hyaline, involved in pale yellow-green mucus.

On horse and cow dung.

Specimens in Rab.-Klotzsch, Herb. Myc., n. 167, examined.

**Ascobolus marginatus.** Mass. Grev., vol. xxi. p. 100.

Ascophore sessile, at first almost globose, then becoming narrowed at the base, apex truncate, disc at length quite plane, bounded by a slightly raised, blunt margin, soft and pellucid, almost hyaline or with a slight tinge of olive, quite glabrous;  $\frac{1}{2}$ –1 mm. across; excipulum parenchymatous, cells almost regularly hexagonal,  $10\text{--}16 \mu$  diameter; asci clavate, apex slightly narrowed, pedicel short, slender, 8-spored, slightly projecting above the surface of the disc at maturity, spores irregularly 2-seriate, elliptical, ends rather acute, continuous, epispore persistently smooth, pale rosy-violet, then purple-brown,  $15\text{--}16 \times 6\text{--}7 \mu$ ; paraphyses hyaline, septate, about  $2 \mu$  thick, apex not thickened; hypothecium minutely parenchymatous.

On dung of ass.

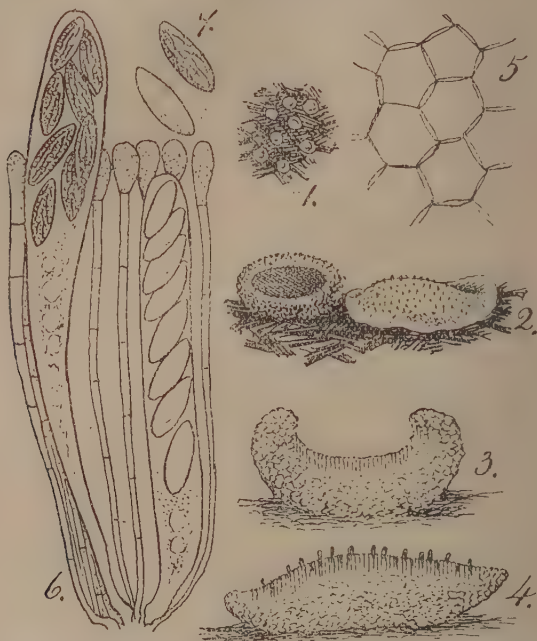
Distinguished by the small size of the spores and by the epispore remaining perfectly smooth, and without marks or lines at maturity.

\* *Externally scurfy or granulated.*

**Ascobolus furfuraceus.** Pers., Tent. Meth., p. 25; Phil., Brit. Disc., p. 290; Sacc., Syll., n. 2143.

Ascophore 1–4 mm. across, globose then expanded, the disc becoming plane then convex, pale yellowish green when moist, the margin externally furfuraceous or scurfy, the disc becoming studded with black points due to the dark-coloured spores in the projecting asci; when old the disc becomes blackish-brown and often depressed, the pale granular margin

erect; asci cylindrical at first and the 8 spores obliquely uniseriate, finally the ascus elongates and becomes clavate upwards and the spores irregularly aggregated near the apex:



*Ascobolus furfuraceus*, Pers.—Fig. 1, plants, nat. size;—Fig. 2, plants, slightly  $\times$ ;—Fig. 3, section of young plant;—Fig. 4, section of mature plant, showing the projecting asci;—Fig. 5, structure of excipulum;  $\times 400$ ;—Fig. 6, portion of disc, showing a young ascus with 1-seriate, colourless spores, and a mature ascus projecting above the level of the disc, and containing coloured spores aggregated near its apex; also paraphyses;  $\times 400$ ;—Fig. 7, free spores at different ages;  $\times 400$ .

spores elliptical, hyaline and smooth at first, then with longitudinal anastomosing delicate wrinkles, passing from lilac through purple to purple-brown at maturity,  $20-27 \times 10-11 \mu$ :

paraphyses numerous, about  $2\mu$  thick, septate, very variable, clavate or cylindrical at the apex, sometimes inflated below the summit, colourless, but involved upwards in a sulphur-coloured mucilage.

*Peziza stercoraria*, Bull., Champ. Fr., t. 376 and 438; Sow., Brit. Fung., tab. xviii.

On cow and horse dung, crowded in patches or scattered. Saccardo states that this species is also met with rarely on dung of deer and cat, also on human dung.

The present very common species illustrates very clearly some of the peculiarities of the genus *Ascobolus*. Examination with a good pocket-lens shows, in a mature specimen, the asci containing their dark-coloured spores, projecting above the surface of the hymenium. If a thin section of an ascophore in this stage is placed under the microscope, some quite young asci cylindrical in outline, with the apex yet below the level of the hymenium, and containing perfectly colourless, smooth spores, usually arranged in a single row, will be seen; other asci will probably be present whose apex has just reached the level of the surface of the hymenium or disc, the upper portion of the asci wider and altogether more clavate than in the younger example previously mentioned, the spores will now be more or less tinged with violet, and present darker streaks extending from end to end, and running into each other; finally some asci will be seen whose apex stands very much above the level of the hymenium or disc, the projecting portion being broadly club-shaped, and the violet-brown spores irregularly huddled together in this upper swollen portion. If this large projecting ascus is traced downwards, it will be seen that the very much narrowed base is still attached to the hypothecium, the ascus does not become free at the base, but remains fixed, the increase in size being due to expansion by the accumulation of water, and is concerned with the dispersion of the spores, and after dehiscence the ascus contracts below the level of the hymenium.

It would probably be noticed when examining the hymenium with a pocket-lens that all the projecting asci were strongly bent in the same direction. This is due to the action of light, the asci being *positively heliotropic*. This can readily be demonstrated by growing the fungus under

two sets of conditions; one exposed to a strong side light, the other in darkness; in the former, all the projecting asci would bend strongly towards the light; in the latter, the asci would stand erect, and would also be retarded for some hours in their appearance. The relation between light and the development of asci is not fully understood, and offers a promising field for those who have time and opportunity to investigate the phenomenon.

**Ascobolus viridulus.** Phil. & Plow., Grev., vol. viii. p. 103; Phil., Brit. Disc., p. 291; Sacc., Syll., viii. n. 2133.

Scattered, sessile, hemispherical, concave then expanded, submarginate, thick, pale yellowish-green, coarsely granulated; asci clavate, spores 8, elliptical, violet, becoming brown, rugose-striate,  $13 \times 6 \mu$ ; paraphyses rather stout, distinctly septate, clavate at the apices, enveloped in a pale green mucus.

On rejectamenta of birds (pigeons?). Spring.

Ascophores  $\frac{1}{2}$ – $\frac{3}{4}$  line broad. This has much the outward character of *A. furfuraceus* in a young state, but the spores are very much smaller.

Not examined.

**Ascobolus crenulatus.** Karsten, Myc. Fenn., i. p. 77; Phil., Brit. Disc., p. 292; Sacc., Syll., viii. n. 2136.

Ascophores gregarious, sessile, at first globose and closed, then expanding, the disc becoming almost plane, yellowish green, outside distinctly scurfy, margin minutely crenulate, 1–1½ mm. across, excipulum parenchymatous, cortical cells 10–12  $\mu$  diameter; asci narrowly clavate, base narrowed into a pedicel, 8-spored; spores remaining irregularly 1-seriate at maturity, elliptical, becoming violet-brown, delicately striate,  $14\text{--}15 \times 6\text{--}8 \mu$ ; paraphyses septate, hyaline, slender, not thickened at the tip.

On grouse dung. Said to have also been found on cow dung.

The principal features of the present species are, the small ascophores with a crenulate margin; narrow asci, and the small spores remaining more or less 1-seriate at maturity.

Specimen in Karsten's Fung. Fenn., n. 763, examined.

**Ascobolus Crouani.** Boud., Ascob., p. 26, pl. 5, fig. 2; Sacc., Syll., viii. n. 2165.



Ascophores gregarious, sessile, at first subglobose then expanding, base somewhat narrowed, margin and exterior scurfy, yellowish-green, disc shining, 1-2 mm. across, becoming brownish when dry and old; hypothecium and excipulum parenchymatous, cortical cells irregularly polygonal, 6-10  $\mu$  diameter, running out in irregular clusters to form the scurfy exterior; asci clavate, attenuated below into a slender pedicel, 8-spored; spores 2-seriate, becoming at last irregularly crowded near the apex of the ascus, rather broadly elliptical, hyaline, then violet, at length brown, epispore with numerous delicate, anastomosing cracks, 14-17  $\times$  8-10  $\mu$ ; paraphyses very slender, septate, equal or slightly clavate at the tips, involved in pale yellow mucus.

Among rotten leaves and on rotten wood.

Distinguished from *A. denudatus* by the scurfy exterior of the ascophore.

**Ascobolus viridis.** Currey, Linn. Trans., xxiv. p. 154, 1863; Phil., Brit. Disc., p. 289, pl. 9, fig. 54; Sacc., Syll., viii. n. 2155 (not of Boudier).

Gregarious, sessile, at first closed then expanding and becoming plane or only very slightly concave, at times irregular in outline, dark dingy olive- or yellowish-green, externally rather coarsely scurfy, 3-6 mm. across; excipulum parenchymatous, cortical cells 12-18  $\mu$  diameter; asci large, clavate, apex somewhat narrowed, with a slender pedicel, 8-spored; spores irregularly 2-seriate, elliptic-fusiform, ends rather pointed, epispore with anastomosing wrinkles, becoming deep, clear purple, 26-30  $\times$  11-13  $\mu$ ; paraphyses numerous, septate, rather stout, slightly thickened at the tip, enveloped in pale yellow-green mucus.

On naked ground in damp places.

The coarsely scurfy exterior of the large ascophore, the large, fusiform spores, and habitat stamp the present species.

Type specimen examined.

**Ascobolus atro-fuscus.** Phil. & Plow., Grev., vol. xi. p. 186, t. 24, fig. 1; Phil., Brit. Disc., p. 291; Sacc., Syll., viii. n. 2160.

Ascophores crowded or scattered, sessile, closed at first, then expanding and becoming concave, finally plane;

margin minutely crenulate, externally scurfy, entirely blackish-brown, 2-4 mm. diameter; excipulum parenchymatous, cortical cells, 20-30  $\mu$  diameter, brown; asci clavate, tapering into a long, slender, often curved pedicel, 8-spored; spores irregularly 2-seriate, broadly elliptical, ends obtuse, hyaline, then violet, at length brown, episporium smooth at first, then becoming broken up into fragments surrounded by hyaline fissures, giving the spore the appearance of being finely verrucose, 20-22  $\times$  12-14  $\mu$ ; paraphyses slender, septate, not much thickened at the tip, slightly longer than the asci.

*Ascobolus viridis*, Boudier, *Ascob.*, p. 27, pl. v. fig. 4 (not of Currey).

*Ascobolus carbonicola*, Boudier, *Bull. Soc. Bot. France*, 1887, p. 310.

On the ground where charcoal has been burnt.

Authentic specimen from Phillips examined.

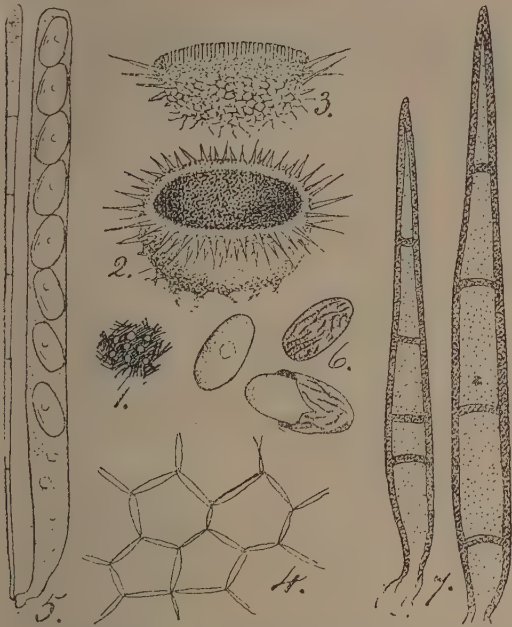
\*\*\* *Externally pilose.*

*Ascobolus barbatus*. Mass. & Crossl., *Grev.*, vol. xxi. p. 99, with fig.

Ascophore up to 1 mm. diameter, gregarious or crowded, hemispherical at first, then almost or quite plane; excipulum parenchymatous; cells irregularly polygonal, large; disc varying from deep orange-red to bright crimson; externally yellowish, pilose, hairs brown, thick-walled, septate, conical, pointed, smooth, 80-130  $\times$  10-12  $\mu$ , largest and most abundant near the margin; asci cylindrical, apex rounded, narrowed at the base to a slender pedicel, 8-spored; spores obliquely 1-seriate, elliptical, ends obtuse, smooth and hyaline for a long time, then the episporium becomes violet and finally violet-brown, and marked with delicate anastomosing lines, 16-18  $\times$  9  $\mu$ ; paraphyses straight, septate, the upper half gradually increasing in thickness, tips about 5  $\mu$  broad, orange.

A remarkable species, intermediate between *Ascobolus* and *Lachnea*, agreeing with the former in having the episporium violet, then brownish, and minutely more or less longitudinally rugulose at maturity, the asci, however, so far as I

have observed, do not project beyond the surface of the disc at maturity; the large-celled parenchymatous excipulum also agrees with *Ascobolus*. In the early stage, while the spores



*Ascobolus barbatus*, Mass. & Crossl. Fig. 1, group of fungi, nat. size;—Figs. 2, 3, entire fungus and section;  $\times 75$ ;—Fig. 4, cells of excipulum;—Fig. 5, ascus with spores and paraphyses;—Fig. 6, spores in various stages of development;—Fig. 7, marginal hairs;—Figs. 4-7  $\times 500$ .

are yet hyaline, the fungus would pass for a species of *Lachnea*.

Mostly closely allied to *Ascobolus brunneus*, Cke., but clearly distinguished by the narrowly cylindrical asci, and 1-seriate, smaller spores.

**Ascobolus immersus.** Pers., Obs., i. p. 35, t. 4, f. 7; Phil., Brit. Disc., p. 292; Sacc., Syll., viii. n. 2171.

Gregarious or scattered, erumpent, somewhat immersed in the matrix at maturity, closed at first, then expanding and becoming almost plane above, narrowed towards the base, soft and somewhat watery,  $\frac{1}{2}$ – $\frac{3}{4}$  mm. across, yellowish-green or amber-colour; externally minutely hairy, hairs scattered or fasciculate, wall rather thick, conical, aseptate, almost colourless,  $30\text{--}50 \times 6\text{--}8 \mu$ , but variable in size; excipulum parenchymatous; cortical cells irregularly polygonal, yellowish,  $10\text{--}14 \mu$  diameter; asci projecting strongly at maturity, 6–10 in number, very large, wall thin, broadly clavate, apex rounded, rather abruptly narrowed into a short, stout pedicel, 8-spored; spores irregularly 2-seriate, elliptic-oblong, ends rounded, smooth, continuous, cell-wall  $3\text{--}4 \mu$  thick; epispore for a long time hyaline, then lilac, finally brown, sometimes more or less longitudinally cracked and showing delicate white streaks,  $60\text{--}70 \times 35\text{--}45 \mu$ ; paraphyses about  $3 \mu$  thick, septate, hyaline, tips not thickened, longer than the asci, surrounded by yellow mucilage.

*Ascobolus gigasporus*, De Notaris, Disc., p. 360.

On dung of horse, cow, sheep, goat, goose, &c.

Specimens in Cooke, Fung. Brit., Exs., n. 397, and Rehm, Ascom., n. 102A, examined.

Somewhat variable in external appearance, and in the extent to which it is immersed in the matrix, but readily distinguished by the very large asci and spores.

**Ascobolus brunneus.** Cooke, Fung. Brit., Exs., n. 286; Phil., Brit. Disc., p. 292; Sacc., Syll., viii. n. 2173 (not of Boudier).

Scattered, sessile, subglobose and closed, then expanding and becoming plane or slightly depressed, pale ochraceous or amber-colour,  $\frac{1}{2}$ – $\frac{2}{3}$  mm. across; externally, especially near the margin, sparingly furnished with hyaline or very slightly coloured aseptate, thick-walled, sharp-pointed hairs, tapering gradually from the usually more or less swollen base,  $75\text{--}130 \times 6\text{--}10 \mu$ ; excipulum parenchymatous; cortical cells irregularly polygonal, yellowish,  $8\text{--}15 \mu$  diameter; asci broadly cylindric-clavate, apex rounded, abruptly narrowed into a short, slender, curved pedicel, 8-spored; spores irregu-

larly 2-seriate, smooth, continuous, elliptic-oblong, ends blunt, for a long time hyaline, then becoming brown,  $20-25 \times 12-14 \mu$ ; paraphyses numerous, hyaline, septate, about  $2 \mu$  thick, scarcely or not at all thickened at the tips.

On cow dung.

Type specimen examined. In Cooke's Fung. Brit., Exs., n. 286, the present species is mixed with *Ascophanus pilosus*.

Agreeing with *Ascophanus pilosus* in the colourless, aseptate, pointed hairs, but differing in the larger spores, which eventually become brown. *Lachnea stercorea* and *L. coprinaria* are at once distinguished by the external hairs being brown and septate.

### SACCOBOLUS. Boud. (fig. 11. p. 156.)

Ascophore sessile, somewhat fleshy, minute, at first subglobose; the disc expanding and becoming plane or slightly convex, at length studded with the tips of the projecting asci; externally glabrous or pilose; excipulum and cortex parenchymatous; asci broadly clavate-oblong, apex rather truncate, base narrowed into a pedicel, 8-spored; spores elliptical, at first hyaline, finally violet or violet-brown, epispore often minutely cracked, when mature aggregated in a cluster surrounded by a special membrane, and situated near the top of the ascus; paraphyses present.

*Saccobolus*, Boudier, Mém. Ascob., p. 38; Phil., Brit. Disc., p. 293; Sacc., Syll., viii. p. 524.

Allied to *Ascobolus* in the coloured spores, but readily separated by having the spores enclosed in a special membrane within the ascus, and aggregated in a group at the apex of the ascus when mature.

\* *Ascophore glabrous*.

*Saccobolus obscurus*. Phil., Brit. Disc., p. 295; Sacc., Syll., viii. n. 2180.

Densely crowded or scattered, sessile, at first globose, the disc gradually expanding and becoming plane or slightly convex, dingy brown, blackish when dry, from  $\frac{1}{2}-\frac{3}{4}$  mm. across, glabrous; excipulum and cortex formed of small,

irregularly polygonal cells; asci clavate, 8-spored; spores broadly elliptical, sometimes the ends are obtuse, usually somewhat pointed, hyaline then violet, finally brown, epispore for a long time smooth, at length slightly granulated,  $13-15 \times 9-10 \mu$ , enclosed in a common sac within the ascus; paraphyses septate, only slightly thickened at the tip.

*Ascobolus (Saccobolus) obscurus*, Cke., Grev., vol. iv. p. 112.

On old sacking.

Type specimen examined.

A fine species, well marked by the broadly elliptical spores.

***Saccobolus depauperatus.*** Phil., Brit. Disc., p. 296; Sacc., Syll., viii. n. 2178.

Ascophores gregarious, sessile, at first subglobose and closed, then expanding until quite plane, glabrous, pallid with a yellow tinge when young, then darker with a dull purple shade, blackish when old and dry, about  $\frac{1}{3}$  mm. across; excipulum parenchymatous, cortical cells  $10-15 \mu$  diameter, irregularly polygonal; asci clavate, apex obtuse and rounded, narrowed below into a stout pedicel, 8-spored; spores elliptical, smooth, dingy violet then clear brown, epispore smooth, continuous,  $12-14 \times 7 \mu$ , enclosed in a common membrane within the ascus; paraphyses septate, hyaline, slightly thickened at the tip.

*Ascobolus depauperatus*, B. & Br., Ann. Nat. Hist., n. 1084, ser. iii., vol. xv. p. 19, pl. 14, fig. 6.

On dung of sheep, horse, and deer.

Type specimen examined, also specimen in Rehm's Ascom., n. 661.

***Saccobolus violascens.*** Boud., Mem. Ascob., p. 40, pl. 8, fig. 19; Phil., Brit. Disc., p. 296; Sacc., Syll., viii. n. 2177.

Ascophores scattered or gregarious, sessile, glabrous, shining, hemispherical then expanded, the disc becoming plane or slightly convex, rarely somewhat undulating, violet or greyish-violet, about 1 mm. across; excipulum parenchymatous; asci broadly clavate, apex somewhat truncate, narrowed at the base into a short, slender, crooked pedicel,

8-spored; spores aggregated into an oblong group and enclosed in a special membrane near the top of the ascus, elliptical, ends rather pointed, sometimes slightly oblique, hyaline at first then becoming blackish-violet and almost opaque by degrees,  $15-16 \times 8-9 \mu$ , epispore generally remaining smooth; paraphyses slender, hyaline, septate, sometimes branched from near the base, tips filiform, tinged with violet.

On cow and rabbit dung.

Distinguished by the small, somewhat fusiform spores, and the violet, pyriform tips of the paraphyses.

Specimen in Phil., Elv. Brit., n. 48, examined.

**Saccobolus neglectus.** Boudier, Ascob., p. 41, pl. 9, fig. 20; Phil., Brit. Disc., p. 295; Sacc., Syll., viii. n. 2183.

Ascophores gregarious, very minute, rarely exceeding  $\frac{1}{2}$  mm. diameter, sessile, globose at first, the disc becoming plane or convex, glabrous; whitish at first, then tinged with grey or lilac, base remaining pale, disc often with a rufous or tawny shade, becoming papillose from the exerted tips of the asci; cells of excipulum and cortex irregularly polygonal, rather large; asci broadly clavate, narrowed to a short, stout, crooked pedicel, 8-spored, apex somewhat truncate; spores forming an oblong cluster contained in a special membrane near the apex of the ascus, elliptical, ends rather pointed, hyaline, then passing through violet to violet-brown and almost opaque,  $17-20 \times 8-9 \mu$ , epispore usually remaining smooth; paraphyses slender, septate, hyaline, simple or branched, often from near the base, tips slightly clavate, enveloped in colourless mucus.

On dung of sheep, cow, horse, ass, dog, &c.

Somewhat resembling *S. violascens*, Boud., but distinguished by the paraphyses being colourless.

**Saccobolus Kerverni.** Boud., Mem. Ascob., p. 39, pl. 8, fig. 18; Phil., Brit. Disc., p. 294; Sacc., Syll., viii. n. 2176. (fig. 11, p. 156).

Ascophores scattered or crowded, sessile, hemispherical or sometimes slightly elongated vertically, closed at first, the disc becoming plane or slightly convex, fleshy, glabrous, golden-yellow or amber, shining,  $\frac{1}{2}-1$  mm. diameter;



excipulum and cells of cortex parenchymatous; asci rather large, cylindric-clavate, pedicel short, stout, 8-spored; spores grouped in an oblong cluster near the apex of the ascus, enclosed in a common membrane within the ascus, elliptical or elliptic-fusiform, hyaline, then passing through violet to brown, epispore sometimes minutely cracked,  $20-22 \times 10-12 \mu$ ; paraphyses slender, septate, often branched from near the base, slightly clavate at the tips, enveloped in yellow mucus.

*Ascobolus Kerverni*, Crouan, Ann. Sci. Nat., 1858, vol. x. pl. 13B, figs. 7-10.

On old cow and horse dung.

Readily distinguished by the yellow colour of the ascophore.

Specimens examined from Cooke's Fung. Brit., ed. ii., n. 399, and Rehm's Ascom., n. 166.

**\*\* *Ascophore minutely pilose.***

***Saccobolus caesariatus.*** Renny, in Phil., Brit. Disc., p. 297; Sacc., Syll., viii. n. 2186.

Minute, hemispherical, white, clothed with colourless, septate, slender, flexuous hairs; disc convex, papillate from the exerted asci; asci broadly clavate; spores elliptic, purple, smooth, enclosed in a common hyaline sac; paraphyses filiform, rather stout, simple or branched.

This is an exceedingly beautiful species, very minute, but, unfortunately, no dimensions are given, nor yet the habitat. It resembles a pure white, sessile *Lachnella*. (Phillips.)

Unknown to me.

**CUBONIA. Sacc.**

Ascophore sessile, hemispherical, becoming obconic, disc at length plane and studded with the projecting points of the asci, externally smooth or pilose; asci clavate, 8-spored; spores globose, hyaline; paraphyses present.

*Cubonia*, Sacc., Syll., vol. viii. p. 527.

*Ascophanus*, Phil., Brit. Disc., p. 304.

Distinguished at once by the globose spores.

**Cubonia Boudieri.** Sacc., Syll., viii. n. 2188.

Minute, sessile, hemispherical, glabrous, clear white; disc plane, papillate; asci broadly cylindraceo-clavate; spores 8, globose, asperate, hyaline; paraphyses filiform, stout.

*Ascobolus Boudieri*, Renny in litt. cum icon.

*Ascophanus Boudieri*, Phil., Brit. Disc., p. 304.

On rabbit dung.

The above description is drawn up from a beautiful drawing sent me by Mr. Renny, but I regret to say no indication of the magnifying power is given, so that I am unable to supply the measurements of the spores. (Phillips.)

Unknown to me.

**ASCOPHANUS.** Boudier. (figs. 36, 37, p. 156.)

Ascophore somewhat fleshy, sessile, the disc becoming plane, externally glabrous or pilose; excipulum parenchymatous, cortical cells polygonal, large; asci broadly clavate, cylindric-clavate, or ovate, dehiscing by a convex operculum, 8-spored; spores hyaline, free in the ascus, elongated; paraphyses present.

*Ascophanus*, Boudier, Ascob., p. 51; Phil., Brit. Disc., p. 303; Sacc., Syll., viii. p. 528.

Distinguished by the asci containing 8 hyaline, free spores.

\* *Ascophore glabrous.*

**Ascophanus microsporus.** Phil., Brit. Disc., p. 307; Sacc., Syll., viii. n. 2191.

Gregarious or crowded, sometimes scattered, sessile, glabrous, globose at first, then expanding, the disc becoming plane or slightly convex and very minutely papillate, dirty white or dingy orange, usually with a tinge of olive; excipulum minutely parenchymatous, cortical cells sub-quadrangle and inclined to be arranged in radiating rows, 5-7  $\mu$  diameter; asci clavate, narrowed into a slender, short,

usually oblique pedicel, 8-spored; spores irregularly 2-seriate, smooth, hyaline, elliptical,  $7-8 \times 3.5-4 \mu$ ; paraphyses slender, tips subglobose, pale olive-green,  $5-6 \mu$  thick.

*Ascobolus microsporus*, B. & Br., Ann. Nat. Hist., n. 1087, ser. iii. vol. xv. p. 19, pl. xvi. fig. 28.

*Ascophanus Coemansii*, Boud., Ascob., p. 54, pl. x. fig. 30.

On cow and sheep dung.

Type specimen examined.

Differs from *A. granuliformis* in the tinge of olive in the ascophore, and its generally duller colour, and in the smaller spores.

***Ascophanus granuliformis*.** Boud., Ascob., p. 55, t. x. f. 31; Phil., Brit. Disc., p. 307; Sacc., Syll., viii. n. 2200.

Gregarious or scattered, sessile, globose, then plane or convex, glabrous, pale ochraceous or sometimes straw-colour,  $\frac{1}{2}-\frac{3}{4}$  mm. across; hypothecium and excipulum parenchymatous, small-celled and delicate, cells of cortex polygonal,  $12-18 \mu$  diameter; asci broadly clavate, pedicel slender, very short, often oblique, 8-spored; spores elliptical, ends obtuse, hyaline, smooth, irregularly 2-seriate,  $10-12 \times 7-8 \mu$ ; paraphyses rather stout, septate; tips clavate or often knobbed,  $6-7 \mu$  thick, sometimes tinged with colour.

*Ascobolus granuliformis*, Crouan, Ann. Sci. Nat., vol. x. pl. 13, figs. 27-35 (1858).

On cow dung,

Specimen examined in Rehm's Ascom., n. 104.

***Ascophanus aurora*.** Boud., Mon. Ascob., p. 58, t. xi., fig. 36; Phil., Brit. Disc., p. 308; Sacc., Syll., viii. n. 1293.

Ascophores minute, scattered, sessile, quite glabrous, shining, at first globose then plane, convex when old, orange-red, conspicuously studded with crystalline points; asci small, clavate, narrowed at the base, 8-spored; spores irregularly 2-seriate, hyaline, elliptical, smooth ( $10 \times 6.5 \mu$ , Phillips); paraphyses slender, septate, simple or 2-3-furcate from near the base, usually curved at the tip, which is not thickened, reddish-orange, especially towards the base.

*Peziza aurora*, Crouan, Fl. Finist., p. 53.

On horse and cow dung.

No specimen seen by me.

Readily known by the orange-red colour and varnished aspect of the ascophore, which is due to the great amount of gelatine present. The paraphyses are very slender, and generally most deeply coloured at the base, from the accumulation of granules. The asci are relatively small, as are also the spores. (Boudier.)

Saccardo—Syll., viii. p. 529—says, under the present species, that in an Italian specimen the asci are cylindric-oblong,  $80 \times 16 \mu$ ; spores 2-seriate, oblong-ellipsoid, 1-guttulate, hyaline,  $14-15 \times 7-8 \mu$ ; paraphyses filiform, forked above.

**Ascophanus cinereus.** Boud., Mon. Ascob., p. 59, t. xi., fig. 37; Phil., Brit. Disc., p. 308; Sacc., Syll., viii. n. 2204.

Gregarious, sessile, fleshy and soft, disc becoming slightly concave or almost plane, pallid at first, then grey, finally often blackish, glabrous, sometimes irregular in form, up to 1 mm. across; hypothecium and excipulum parenchymatous, cells irregularly polygonal, cortical cells largest and coloured; asci cylindric-clavate, narrowed into a slender pedicel, 8-spored; spores 1-seriate or towards maturity inclined to become irregularly 2-seriate above, elliptical, hyaline, smooth,  $18-22 \times 10-12 \mu$ ; paraphyses slender, septate, simple or sometimes forked low down, tips not thickened, slightly longer than the asci.

*Ascobolus cinereus*, Crouan, Ann. Sc. Nat., vol. x. pl. 13D, figs. 17-20.

On horse and cow dung.

Specimen in Rehm's Ascom., n. 470, examined.

Boudier says that the epispore is granulated; this feature I have not observed in Rehm's specimens, neither in Currey's British specimens, yet such may probably be the condition presented by the spores at maturity. In some instances in Rehm's specimen, the free spores were slightly tinged with brown, and furnished with a small pale papilla or wart at each end.

When young, the exterior of the ascophore is often minutely mealy or pruinose.

**Ascophanus argenteus.** Boud., Mem. Ascob., p. 55, t. 11, fig. 32; Phil., Brit. Disc., p. 306; Sacc., Syll., viii. n. 2159.

Gregarious, minute, not exceeding  $\frac{1}{4}$  mm. across, sessile, disc almost plane and becoming narrowed downwards, glabrous, soft and translucent when moist, silvery white; excipulum parenchymatous, cells polygonal, 7–10  $\mu$  diameter, asci broadly clavate, slenderly but shortly stipitate, 8-spored; spores irregularly 2-seriate, elliptical, hyaline, smooth, 11–12  $\times$  6–7  $\mu$ ; paraphyses septate, hyaline, slender, clavate at the tip.

*Ascobolus argenteus*, Currey in Cooke's article on *Ascobolus*, in Journ. Bot., 1864, fig. 6.

On cow dung.

Type specimen examined.

A very minute species, looking like pellucid silvery drops under a lens.

**Ascophanus ochraceus.** Boud., Ascob., p. 57, t. 11, fig. 34; Phil., Brit. Disc., p. 311; Sacc., Syll., n. 2201.

Somewhat gregarious or scattered, sessile, almost globose at first, disc becoming plane or convex, rather fleshy, glabrous, ochraceous, sometimes pale, about 1 mm. across; cortical cells polygonal, 10–12  $\mu$  diameter; asci clavate, apex somewhat narrowed, narrowed into a somewhat slender pedicel, 8-spored; spores irregularly 2-seriate, hyaline, smooth, elliptical, 15–16  $\times$  9  $\mu$ ; paraphyses slender, hyaline, septate, tips thickened and usually curved.

*Ascobolus ochraceus*, Crouan, Flor. Finist., p. 57.

On old cow dung, rare on sheep dung.

Specimen examined in Phil., Elv. Brit., n. 140. The specimen—in the Kew copy—in Cke., Fung. Brit., ed. ii., n. 559, called *Ascophanus ochraceus*, is typical *Ascophanus granuliformis*.

Superficially resembling *A. granuliformis*, but distinguished by the larger spores, and the paraphyses being curved at the tips.

**Ascophanus subfuscus.** Boud., Ascob., p. 52, pl. 10, fig. 28; Phil., Brit. Disc., p. 305; Sacc., Syll., viii. n. 2209.

Crowded or more rarely scattered, sessile, hemispherical,

disc plane, rather fleshy, glabrous, brown, when dry blackish-brown, concave and with the margin irregularly incurved, about  $\frac{1}{3}$  mm. across; excipulum parenchymatous, cells, like those of the cortex, small; asci clavate, tapering uniformly from apex to base, 8-spored; spores at first 1-seriate, becoming irregularly 2-seriate above, hyaline, smooth, elliptical,  $9-10 \times 4.5-5 \mu$ ; paraphyses septate, slender, clavate or piriform at the apex, which is tinged brown when living, 5-6  $\mu$  broad.

On dung of cow and dog. Has also been found on human dung in Germany.

Specimen examined in Cke., Fung. Brit., ed. ii. n. 657.

**Ascophanus consociatus.** Phil., Brit. Disc., p. 312; Sacc., Syll., viii. n. 2221.

Ascophores gregarious, sessile, subglobose then expanding until the disc is almost plane, whitish, often with a tinge of yellow, externally granulated owing to the large, projecting, cortical cells, which vary from  $15-20 \mu$  diameter, about 1 mm. across; excipulum parenchymatous; asci broadly clavate, pedicel short, stout, 8-spored; spores irregularly 2-seriate, hyaline, smooth, broadly fusiform, contents granular,  $11-12 \times 7 \mu$ ; paraphyses septate, hyaline, very slightly thickened at the tips.

*Ascobolus consociatus*, B. & Br., Ann. Nat. Hist., ser. 4, vol. xv. p. 39, pl. 2, fig. 7.

On decayed wood, on the remains of *Sphaeria cupulifera*.

Type specimen examined.

**Ascophanus minutissimus.** Boud., Ascob., p. 53, t. 10, f. 29; Phil., Brit. Disc., p. 305; Sacc., Syll., viii. n. 2212. (figs. 36, 37, p. 156.)

Very minute, hardly visible under a lens, always scattered, hemispherical, disc plane, brown or tawny, margin blackish; asci broad, narrowed towards the base, 8-spored; spores smooth, hyaline, elliptical, ends rather pointed, 7 and  $4 \mu$ , irregularly 2-seriate; paraphyses simple, septate, broadly pyriform and greenish-yellow at the tips.

On dung of horses and sheep.

Unknown to me.

Somewhat resembling *A. subfuscus*, differing in the asco-

phores being scattered, the spores smaller, and the large, pyriform tips of the paraphyses tinged greenish-yellow.

**Ascophanus carneus.** Boud., Mém. Ascob., p. 250, pl. 12, fig. 38; Phil., Brit. Disc., p. 309; Sacc., Syll., viii. n. 2216.

Gregarious or scattered, sessile, usually surrounded at the base by delicate white hyphae, at first globose, then expanding until the disc is almost plane, immarginate, glabrous; colour variable, ranging through flesh-red, dingy orange, rosy, and salmon colour; hypothecium and excipulum composed of almost spherical hyaline cells, ranging up to  $20\ \mu$  diameter; asci clavate, contracted below into a slender, usually curved pedicel, 8-spored; spores hyaline, irregularly 2-seriate, continuous, smooth, elliptical, ends obtuse,  $18\text{--}20 \times 10\text{--}12\ \mu$ ; paraphyses septate, tips clavate, containing orange granules,  $6\ \mu$  across.

*Ascobolus carneus*, Pers., Syn. Fung., p. 676.

*Ascophanus carneus*,  $\beta$  *cuniculi*, Boud., Mém. Ascob., p. 250, pl. 12, fig. 39; Phil., Brit. Disc., p. 309; Sacc., Syll., viii. n. 2216.

*Ascophanus saccharinus*, Boud., Mém. Ascob., p. 251, pl. 12, fig. 40; Sacc., Syll., viii. n. 2217.

*Ascophanus carneus*,  $\gamma$  *saccharinus*, Phil., Brit. Disc., p. 310.

*Ascobolus saccharinus*, Berk. & Curr., in Berk., Outl. Fung., p. 374.

On dung of cow and rabbit, also on old leather, cloth, rope, &c. Phillips states that he has seen this species on nettle stems.

Specimen of *Ascobolus carneus*, named by Persoon, examined, also Berkeley's type of *A. saccharinus*. Specimens contained in Phil., Elv. Brit., n. 197, Rehm, Ascom., n. 425, and Oke., Fung. Brit., ed. ii. n. 398, contain *Ascophanus carneus*, as here understood.

**Var. testaceus.** Mass.

Gregarious, sessile, at first globose, then expanding and becoming plane or slightly depressed, glabrous,  $1\text{--}1\frac{1}{2}$  mm. across, brick-red to dingy orange; hypothecium and excipulum parenchymatous, cortical cells polygonal,  $10\text{--}12\ \mu$  diameter; asci large, broadly clavate, narrowed into a some-



what slender pedicel, 8-spored; spores irregularly 2-seriate, hyaline, elliptical, for a long time smooth, then minutely granular,  $17-18 \times 9-10 \mu$ ; paraphyses septate, rather stout, tips clavate,  $4-6 \mu$  broad.

*Ascobolus testaceus*, Moug., Wallr. Fl. Crypt., iv. p. 513.

*Ascophanus testaceus*, Phil., Brit. Disc., p. 310, pl. 9, fig. 58; Sacc., Syll., viii. n. 2219.

On old sacking, linen, also on rabbit and mouse dung.

Specimen examined in Phil., Elv. Brit., n. 98.

**\*\* *Ascophore pilose.***

***Ascophanus equinus.* Mass.**

Ascophores gregarious, sessile, turbinate, disc becoming plane or slightly convex, orange or tawny-orange, margin smooth and naked, externally sparsely clothed with thick-walled, pointed, aseptate hairs, which are more or less swollen near the base, hyaline or with a yellow tinge;  $150-225 \times 6-8 \mu$ ; excipulum parenchymatous, cortical cells large, polygonal, somewhat elongated; asci narrowly cylindrical; curved, and with a slender pedicel when young, the spores at this period obliquely 1-seriate, ascus afterwards broadly clavate, apex somewhat abruptly narrowed and truncate, 8-spored; spores irregularly 2-seriate, hyaline, continuous, smooth, elliptical, ends obtuse,  $18-22 \times 11-13 \mu$ ; paraphyses septate, about  $2 \mu$  thick, scarcely or not at all thickened at the tip, often branched upwards, containing orange granules.

*Peziza equina*, Müll., Flor. Dan., tab. 979, fig. 3.

*Lasiobolus equinus*, Karst., Rev., p. 122; Sacc., Syll., viii. n. 2224.

*Ascophanus pilosus*, Boud., Ascob., p. 64, t. xii. figs. 42-44; Phil., Brit. Disc., p. 312.

*Ascophanus pilosus*, var. *ciliatus*, Phil., Brit. Disc., p. 312.

On dung of horse, ass, cow, rabbit, &c.

A very beautiful species; ovate when young, the disc being entirely closed, and the external hairs pointing upwards in a close bundle; as the disc expands the hairs spread, and have only a slight upward direction.

**RYPAROBIUS.** Boud. (emended.) (figs. 34, 35, p. 156.)

Ascophore minute, sessile, at first subglobose, the disc expanding until plane or slightly convex, fleshy, glabrous or ciliated at the margin; excipulum parenchymatous, cortical cells irregularly polygonal, large; asci broadly cylindric-clavate, dehiscing by an apical operculum, protruding above the level of the disc at maturity, 16-many-spored; spores hyaline, smooth, elongated, in some species aggregated in a cluster near the top of the ascus before dehiscence; paraphyses present.

*Ryparobius*, Boud., Ascob., p. 47 (in part); Phil., Brit. Disc., p. 298 (in part); Sacc., Syll., viii. p. 539.

*Thecotheus*, Boud., Ascob., p. 45; Phil., Brit. Disc., p. 297.

*Ascozonus*, Renny.

Distinguished at once by the asci containing 16 or more hyaline spores.

\* *Spores not more than 32 in an ascus.*

**Ryparobius Pelletieri**, Sacc., Mich., i. p. 605; Syll., viii. n. 2243. (fig. 38, p. 156.)

Ascophores scattered or gregarious, cylindrical or subglobose at first, then expanding until the disc is quite plane, white, or with a very slight grey or rosy tinge, delicately pruinose on the outside,  $\frac{3}{4}$ –1 mm. across; excipulum parenchymatous; asci broadly cylindric-clavate, pedicel short, stout, often oblique, 32-spored, projecting prominently above the level of the disc; spores elliptical, ends somewhat pointed, smooth, hyaline, wall rather thick,  $26\text{--}32 \times 14\text{--}16 \mu$ ; paraphyses septate, hyaline, slender, often branched from near the base, tips only very slightly thickened, longer than the asci.

*Ascobolus Pelletieri*, Crouan, Fl. Finist., p. 56.

*Thecotheus Pelletieri*, Boud., Ascob., p. 46, t. 9, fig. 22; Phil. Brit. Disc., p. 297, pl. ix., fig. 56.

On dung of horse, cow, sheep, and dog.

Distinguished among species having more than 8 spores in an ascus, by the large asci, which project for about half

their length above the level of the disc at maturity. The spores are surrounded by a layer of mucus when young.

**Ryparobius tenacellus.** Phil., Grev., xix. p. 74; Sacc., Syll., Suppl., vol. x. n. 4592.

Scattered; at first cylindrical, then hemispherical, immarginate, entirely white, about  $\frac{1}{3}$  mm. across, excipulum parenchymatous, external cells about  $10\ \mu$  diameter; disc plane or slightly convex; asci broadly cylindric-clavate, 32-spored, dehiscing by a distinct annular apical lid; spores smooth, continuous, elliptical, hyaline,  $10-12 \times 7-8\ \mu$ ; paraphyses rather stout, septate,  $5-6\ \mu$  thick at the clavate tip, hyaline.

On rabbit dung.

This species approaches *Ryparobius albidus*, Boud., but has larger asci and spores, and is quite white.

**Ryparobius parvisporus.** Phil., Brit. Disc., p. 303; Sacc., Syll., viii. n. 2250.

Very minute, fragile, somewhat more fleshy than other species, white and brilliant at first, then duller, with a faintly vinous tinge; substance formed of bladdery polygonal cells, unequal in size, and often projecting in hair-like threads; margin unevenly fringed with somewhat roughened subulate hairs, often in a partly double row; disc at first flat, then filled with the prominent, broadly clavate asci; spores 16-24, elliptic, hyaline, smooth; paraphyses filiform, stout, septate.

*Ascozonus parvisporus*, Renny, Trans. Woolhope Club, 1873, p. 131, pl. 3, figs. 1-5; Journ. Bot. 1874, p. 356, t. 156, figs. 1-5.

On rabbit dung. Autumn.

Unknown to me.

**Ryparobius Crouani.** Phil., Brit. Disc., p. 300; Sacc., Syll., viii. n. 2246.

Very minute, at first clear white, then whitish, fragile, sessile, hemispherical, glabrous, cortex formed of a single series of cells; margin ciliated with a single series of rough, subacuminate hairs; asci broadly clavate; spores 32, oblong-fusiform, obtuse at the ends, hyaline, smooth; paraphyses not seen.

*Ascozonus Crouani*, Renny, in Trans. Woolhope Club, 1873, p. 130, t. 3, figs. 6-10, and in Journ. Bot., 1874, p. 356, t. 154, figs. 6-10.

On rabbit dung.

Ascophores  $\frac{1}{150}$ , rarely  $\frac{1}{100}$  of an inch broad, formed of a single layer of subcubical cells, with a single row of sharp, pointed hairs, often roughened at their sides about  $\frac{1}{6}$  to  $\frac{1}{3}$  of the whole height; disc plane, granulate; asci narrower than usual; spores normally 32, oblong-fusiform. To be distinguished from *A. cunicularis* by the shorter and tapering rough cilia, as well as by the thinness and transparency of the walls. (Renny.)

No specimen seen by me.

**Ryparobius sexdecemsporus.** Sacc., Syll., viii. n. 2241.

Scattered or gregarious, sessile, subglobose, the disc expanding and becoming plane or slightly convex, glabrous, white, then tinged grey, finally yellowish, 1-1.5 mm. across, the hypothecium and excipulum are parenchymatous, cortical cells polygonal, 14-16  $\mu$  diameter; asci broadly cylindric-clavate, rather abruptly narrowed at the base into a short, stout pedicel, 16-spored; spores elliptical, ends blunt, hyaline, 10-12  $\times$  6  $\mu$ ; paraphyses septate, hyaline, often branched, sometimes curved at the very slightly thickened tips.

*Ascobolus sexdecemsporus*, Crouan, Ann. Sci. Nat., 1858, vol. x. p. 195, pl. 13 E, figs. 21-26.

*Ascophanus sexdecemsporus*, Boud., Mém. Ascob., p. 57, pl. xi, fig. 35.

On dung of cow and horse.

Distinguished from *R. Pelletieri* by the very much smaller spores having the ends blunt and rounded.

\*\* *Spores more than 32 in an ascus.*

† *Ascophore glabrous.*

**Ryparobius Cookei.** Boud., Ascob., p. 48, pl. ix, fig. 24; Phil., Brit. Disc., p. 299, pl. 9, fig. 57. (figs. 34, 35, p. 156.)

Crowded, often confluent and forming a continuous crust, hemispherical, glabrous, more or less tawny, the plane disc usually paler, up to 1 mm. across; excipulum parenchymatous, cortical cells polygonal, 12–15  $\mu$  diameter; asci broadly cylindric-clavate, suddenly contracted into a very short, stout, usually oblique pedicel; spores 48–64, hyaline, elliptical, smooth,  $8-10 \times 4-5 \mu$ , aggregated in a cluster near the apex of the ascus at maturity; paraphyses scanty, septate, hyaline, scarcely thickened at the tips.

*Ryparobius crustaceus*, Sacc., Syll., viii. n. 2231.

On dung of horse, cow, dog, rabbit, &c.

Distinguished by the densely crowded habit of growth and the number of spores in the ascus, which is normally 64.

Specimen in Rehm's Ascom., n. 771, examined.

**Ryparobius dubius.** Boud., Ascob., p. 240, pl. x., fig. 26; Phil., Brit. Disc., p. 300; Sacc., Syll., viii. n. 2240.

Scattered, very minute, scarcely visible under a lens, often immersed, globose, the disc expanding and becoming convex, pallid, pellucid, immarginate; asci broadly ovate or oblong-ovate, very slightly or not at all narrowed at the base, spores numerous (probably 128), hyaline, smooth, elliptical, ends rather pointed ( $6 \times 4 \mu$  according to Rehm), aggregated in a cluster near the top of the ascus at maturity; paraphyses absent or rare, short, hyaline, septate.

On dung of horse, rabbit, and sheep.

Unknown to me.

Distinguished by the very small size of the ascophore, and the numerous small spores.

\* †† *Ascophore ciliated or pilose.*

**Ryparobius argenteus.** B. & Br., Ann. Nat. Hist., ser. 4, vol. ii. p. 347, pl. ix., fig. 11; Phil., Brit. Disc., p. 301; Sacc., Syll., n. 2248.

Scattered, very minute, scarcely  $\frac{1}{3}$  mm. diameter, sessile, at first subglobose, then becoming plane, silvery white, margin fringed with delicate, thin-walled, pointed hairs,  $50-65 \times 5-6 \mu$ ; excipulum parenchymatous; asci short, broadly cylindric-clavate, pedicel short, stout, containing

64 hyaline, smooth, fusiform spores,  $17-18 \times 5-6 \mu$ , aggregated in a cluster near the top of the ascus at maturity; paraphyses septate, hyaline, slender, often branched.

*Ascozonus cunicularius*, Renny, Trans. Woolhope Club, 1873, p. 129, t. 1, fig. 1-4; Journ. Bot. 1874, p. 355, figs. 1-4.

On rabbit dung, for the most part attached to filaments of *Mucor*.

Type specimen examined.

Readily distinguished by the narrowly fusiform spores.

**Ryparobius subhirsutus.** Phil., Brit., Disc., p. 302; Sacc., Syll., viii. n. 2245

Minute, sessile, hemispherical, pure white, nearly transparent, dotted with short unequal hairs, which are mostly connate in pairs or threes; margin ciliated; disc flat, coarsely papillate; asci very wide, oblong, narrowed at the base somewhat abruptly to a point; spores about 128 (not less), elliptic, hyaline, smooth, collected at length into an ovoid mass in the upper part of the ascus; paraphyses not seen.

*Ascozonus subhirsutus*, Renny, Trans. Woolhope Club, 1873, p. 131, t. 2, figs. 4-7; Journ. Bot., 1874, p. 357, t. 155, figs. 4-7.

On rabbit dung.

No specimen seen.

**Ryparobius Woolhopensis.** B. & Br., Ann. Nat. Hist., n. 1395; Phil., Brit. Disc., p. 302; Sacc., Syll., viii. n. 2247.

Minute, scattered, at first pure white, then dingy, with a thick stem-like base, which is tuberculate, covered with close-set hairs which fringe the margin, at length expanding, the hairs disappearing with age; substance of base vesicular; asci broadly clavate, sporidiferous cysts seated towards the apices; spores 64, broadly fusiform, hyaline, smooth,  $17-18 \times 5 \mu$ ; paraphyses filiform, stout, simple.

*Ascozonus Woolhopensis*, Renny, Trans. Woolhope Club, 1873, p. 130; Journ. Bot., 1874, p. 356; t. 153.

On bird dung, mixed with filaments of *Mucor*, and mostly borne by them. Ascophores  $\frac{1}{2}$  a line wide and high.

Unknown to me.

*Ryparobius Leveilleanus*. Phil., Brit. Disc., p. 301; Sacc., Syll., viii. n. 2249.

Very minute, shortly stipitate, silvery white; stem formed of rounded, prominent cells; body of ascophore of smaller, much flattened cells; margin ciliated with a single row of short irregular hairs; disc papillate; asci very broad, tapering below, with an umbonate operculum; spores 64-96, oblong fusiform, obtuse at the ends, hyaline, smooth; paraphyses not seen.

*Ascozonus Leveilleanus*, Renny, Trans. Woolhope Club, 1873, p. 130, figs. 1-5.

*Ascozonus Leveillei*, Renny, Journ. Bot., 1874, p. 356, pl. 154, figs. 1-5

On rabbit dung. Winter.

Ascophores  $\frac{1}{80}$  to  $\frac{1}{120}$  of an inch wide. (Renny.)

Not examined.

## Fam. VII. PEZIZAE.

The present group includes a large number of species, and as a whole is characterised by the superficial, sessile or often distinctly stipitate ascophore, fleshy or waxy consistency, soon decaying after maturity, and the fixed asci—not projecting above the level of the disc at maturity. In the great majority of species the spores are hyaline, and most frequently continuous, although among the minute species septate spores occur. In the brittle species, which decay quickly after the spores are mature, the hypothecium and excipulum are truly parenchymatous, the cells being irregularly polygonal—mostly hexagonal—in outline, and frequently of large size. On the other hand, where the substance is somewhat leathery and persistent, as in some species of *Otidea*, the hypothecium and excipulum are formed of slender, intricately interwoven hyphae.

The genus *Pseudopeziza*, included in the Pezizae on account of its close affinity with *Mollisia*, differing in fact only in being truly erumpent, is also closely allied to the genus *Phacidium*, thus connecting the Pezizae with the *Phacidieae*. On the other hand, the genus *Helvella* connects the *Helvelleae* with the Pezizae.



As in all large natural groups, the genera converge and even overlap at various points, hence in almost every genus there are certain species that oscillate between two or more genera. For the same reason the grouping of the genera into sections is a difficult matter, and the following arrangement does not profess to be more than an endeavour to facilitate the recognition of genera and species; the many-sided relationship between genera and species being reserved for a separate work, experience having shown the impossibility of accomplishing such an object in a work primarily devoted to the elucidation of *species*.

### Sect. I. GLABRATAE.

Ascophore glabrous, mostly minute; saprophytes or parasites, growing on plants.

### Sect. II. VESTITAE.

Ascophore hirsute or pilose, or seated on a well developed subiculum; saprophytes, growing on plants or on the ground,

### Sect. III. CARNOSAE.

Growing on the ground; usually fleshy; often large.

Externally glabrous or scurfy—furfuraceous. Sometimes minutely silky or downy, but never truly pilose.

## GLABRATAE.

**Pseudopeziza.** Ascophore sessile, distinctly erumpent; spores continuous or 1-septate.

**Mollisia.** Ascophore sessile, superficial; spores continuous or 1-septate.

**Mollisiella.** Spores globose; in other respects as in *Mollisia*.

**Belonidium.** Ascophore sessile; spores 3-many-septate.

**Pocillum.** Ascophore minute; cylindrical and narrowed at the base, but sessile.

**Stamnaria.** Ascophore sessile or shortly stipitate. Growing on stems of species of *Equisetum*.

**Helotium.** Ascophore firm and waxy, sessile or shortly stipitate, margin entire; stem usually not longer than diameter of disc.

**Cyathicula.** Margin of ascophore more or less distinctly toothed, sessile or shortly stipitate; spores continuous or septate.

**Ciboria.** Ascophore seated on a long, slender stem, not springing from a sclerotium; margin entire.

**Sclerotinia.** Ascophore seated on a long, slender stem springing from a sclerotium.

**Chlorosplenium.** Ascophore stipitate, typically coloured green, and staining the wood on which it grows of a green colour.



## PSEUDOPEZIZA. Fekl. (emended.) (figs. 43, 44, p. 156.)

Parasites or saprophytes; ascophore erumpent, sessile, sometimes narrowed at the base, glabrous, minute; cortex parenchymatous, cells irregularly polygonal; asci narrowly clavate, apex usually narrowed, 4-8-spored; spores smooth, hyaline, narrowly elliptical or fusiform, continuous or 1-septate; paraphyses present.

*Pseudopeziza*, Fuckel, Symb. Myc., p. 290; Sacc., Syll., viii. p. 723 (both in part).

*Mollisia*, Phillips, Brit. Disc., p. 171 (in part.)

Many of the species are true parasites, growing on living

FIGURES ILLUSTRATING THE *HELVELLEAE*, &c.

Fig. 1, *Morchella esculenta*, Pers., entire fungus; about  $\frac{1}{3}$  nat. size;—Fig. 2, ascus and paraphysis of same; highly  $\times$ ;—Fig. 3, spores of same;  $\times 330$ ;—Fig. 4, *Rhizina undulata*, Fries, entire fungus; about  $\frac{1}{2}$  nat. size;—Fig. 5, section of same, showing the numerous rhizoids; about  $\frac{1}{2}$  nat. size;—Fig. 6, ascus and paraphyses of same; highly  $\times$ ;—Fig. 7, spores of same;  $\times 300$ ;—Fig. 8, *Geoglossum glutinosum*, Pers., entire fungus; about  $\frac{2}{3}$  nat. size;—Fig. 9, ascus and paraphyses of same; highly  $\times$ ;—Fig. 10, spore of same;  $\times 300$ ;—Fig. 11, *Leptoglossum microsporum*, Sacc., ascus and paraphysis; highly  $\times$ ;—Fig. 12, spores of same;  $\times 300$ ;—Fig. 13, *Geoglossum viscosum*, Pers., paraphyses highly  $\times$ ;—Fig. 14, *Gyromitra esculenta*, Fries, entire fungus; about  $\frac{1}{2}$  nat. size;—Fig. 15, spore of same;  $\times 300$ ;—Fig. 16, *Gyromitra gigas*, Cooke, spore;  $\times 300$ ;—Fig. 17, *Helvella crispa*, Fries, entire fungus; about  $\frac{1}{2}$  nat. size;—Fig. 18, spores of same;  $\times 300$ ;—Fig. 19, *Verpa digitaliformis*, Pers., entire fungus, about  $\frac{2}{3}$  nat. size;—Fig. 20, section of pileus and upper part of hollow stem of same; about  $\frac{2}{3}$  nat. size;—Fig. 21, ascus and paraphysis of same; highly  $\times$ ;—Fig. 22, *Spathularia flavida*, Pers., entire fungus; about  $\frac{2}{3}$  nat. size;—Fig. 23, free spore of same;  $\times 300$ ;—Fig. 24, ascus and paraphyses of same; highly  $\times$ ;—Fig. 25, *Leotia lubrica*, Pers., single plant; about  $\frac{2}{3}$  nat. size;—Fig. 26, section of pileus of same; about  $\frac{2}{3}$  nat. size;—Fig. 27, ascus and paraphysis of same;  $\times 300$ ;—Fig. 28, free spores of same;  $\times 300$ ;—Fig. 29, *Mitrula paludosa*, Fr., about  $\frac{2}{3}$  nat. size;—Fig. 30, ascus and paraphyses of same;  $\times 300$ ;—Fig. 31, *Morchella conica*, Pers., var. *deliciosa*, Fr., fungus; about  $\frac{2}{3}$  nat. size;—Fig. 32, *Vibrissia truncorum*, Fries, group of plants; nat. size;—Fig. 33, section of pileus of same, showing the spores escaping; slightly  $\times$ ;—Fig. 34, portion of a spore of same;  $\times 750$ ;—Fig. 35, ascus and paraphyses of same; highly  $\times$ ;—Fig. 36, *Peziza ochracea*, Boudier, two plants; nat. size;—Fig. 37, ascus and paraphyses; highly  $\times$ .

leaves; others are saprophytes, and occur on fading leaves, dead or dying herbaceous stems, wood, &c.

Closely allied to *Mollisia*, in fact to be distinguished only by being truly erumpent, a primitive habit from which those species at present constituting the genus *Mollisia* have emerged. *Belonidium*, another closely allied genus, differs in the superficial ascophore and the 3-many-septate spores. Finally the present genus approaches *Phacidium* in having the ascophore at first immersed in the substratum and erumpent, but differs in the ascophore protruding from the substratum, [and not remaining immersed at maturity. *Coccomyces* and *Coccophacidium* differ in having the spores arranged in a parallel fascicle in the ascus.

\* *On leaves of Angiosperms.*

*Pseudopeziza trifolii*. Eckl., Symb. Myc., p. 290; Sacc., Syll., viii. n. 2970.

Epiphyllous, sessile, gregarious in small clusters on dark spots, erumpent and girt by the ruptured epidermis, soon plane, dingy yellow, glabrous, about  $\frac{1}{3}$  mm. across; excipulum parenchymatous, margin somewhat irregular; asci clavate, 8-spored; spores 2-seriate or sometimes almost obliquely 1-seriate, hyaline, elliptic-oblong or sometimes inclined to be broadest at the apex, usually 2-guttulate,  $10-15 \times 5-6 \mu$ ; paraphyses hyaline, rather stout, sometimes branched.

*Ascobolus trifolii*, Biv. Beruk., Manip., p. 27, t. vi., fig. 5.

*Mollisia trifolii*, Phil., Brit. Disc., p. 199.

On living clover leaves.

The ascophores are situated on the under surface of the leaves, and resemble the pustules of a *Puccinia* in appearance, being surrounded by the ruptured epidermis.

Specimens in Cooke, Fung. Brit., n. 331, and ed. ii., n. 451, examined.

*Pseudopeziza typhae*. Mass.

Ascophores erumpent, sessile, scattered or gregarious, subglobose and closed, soon almost plane, blackish, soft,  $\frac{1}{3}-\frac{1}{2}$  mm. across, glabrous; hypothecium, passing into a parenchy-

matous brown cortex, cells 6-8  $\mu$  diameter, running out at the margin into parallel, clavate, septate, brown hyphae; asci clavate, apex narrowed, 8-spored; spores irregularly 2-seriate, hyaline, narrowly fusiform, distinctly 1-septate at maturity, straight, 10-14  $\times$  2.5  $\mu$ ; paraphyses hyaline, about 2  $\mu$  thick, slightly thickened at the tip.

*Peziza (Mollisia) typhae*, Cke., Grev., i. p. 131.

*Mollisia typhae*, Phil., Brit. Disc., p. 188; Sacc., Syll., viii. n. 1429.

*Mollisia epitypha*, Rehm, Krypt. Fl. Disc., p. 532?

On dead leaves of *Typha*.

Externally resembling *M. atrata*, but known by the larger spores, which become distinctly 1-septate at maturity. The septa show up very clearly when the spores are treated with a solution of iodine.

Type specimen examined, also Cke., Fung. Brit., n. 570, and Phil., Elv. Brit., n. 127.

**Pseudopeziza ranunculi.** Sacc., Syll., viii. n. 2979.

Gregarious on brown spots or scattered, hypophyllous, innate, erumpent, at first closed then expanding and becoming discoid, blackish, thin and soft, glabrous, about  $\frac{1}{2}$  mm. across, hypothecium composed of hyaline, aseptate, densely interwoven hyphae about 4  $\mu$  thick, these pass into a truly parenchymatous excipulum, cortical cells nearly similar in every part, irregularly polygonal, smoky olive, 8-10  $\mu$  diameter; asci clavate, apex slightly narrowed, pedicel short, rather stout, 8-spored; spores irregularly 2-seriate, hyaline, oblong-clavate, apex broadest, ends obtuse, for a long time continuous, then 1-septate, the septum placed below the middle of the spore, 15-16  $\times$  6-7  $\mu$ ; paraphyses hyaline, continuous, about 2  $\mu$  thick, apex thickened.

*Phlyctidium ranunculi*, Wallr., Fl. Crypt., ii. p. 416.

*Mollisia ranunculi*, Phil., Brit. Disc., p. 200.

*Phacidium litigiosum*, Roberge, Ann. Sci. Nat., 1847, p. 181, t. 8.

*Fabraea litigiosa*, Sacc., Syll., viii. n. 3015.

On fading leaves of *Ranunculus repens*, and other species.

Specimens examined in Cke., Fung. Brit., Exs., ed. ii., n. 452, and Rehm's Ascom., n. 659.

Saccardo makes two species, placed in widely separated



genera, of the present fungus, as shown in the synonymy. His *Fabraea litigiosa* is said to be distinguished by the 1-septate spores, and in the ascophores not being crowded on brown spots; but Rehm, *Ascom.*, 659, quoted by Saccardo under this form, has the ascophores densely crowded on brown patches, whereas in other exsiccati the ascophores are scattered, and the spores continuous.

**Pseudopeziza cerastiorum.** Fekl., *Symb. Myc.*, p. 291; Sacc., *Syll.*, viii. n. 2976.

Gregarious, epiphyllous, sessile, innate, erumpent, orbicular and plane, glabrous, firm, pale reddish-yellow, sometimes quite pale, up to 1 mm. across; excipulum parenchymatous, cortical cells irregularly polygonal, smoky yellowish-olive, 7-9  $\mu$  diameter; asci clavate, apex slightly narrowed, pedicel short, stout, truncate, 8-spored; spores irregularly 2-seriate, hyaline, continuous, smooth, straight, narrowly cylindric-oblong, ends obtuse, sometimes very slightly widest at the apex, often 2-guttulate, 9-12  $\times$  3  $\mu$ ; paraphyses slender, hyaline, continuous, slightly thickened at the tip.

*Peziza cerastiorum*, Wallr., *Cr. Fl. Germ.*, p. 465.

*Mollisia cerastiorum*, Phil., *Brit. Disc.*, p. 199.

On living or fading leaves of species of *Cerastium*.

Specimen examined in Cke., *Brit. Fung.*, n. 655.

**Pseudopeziza calthae.** Mass.

Gregarious on brown spots on the under surface of the leaf, innate then erumpent, usually surrounded by the torn epidermis, disc plane or convex, not distinctly marginate, pale brown or greyish,  $\frac{1}{3}$ - $\frac{1}{2}$  mm. across; excipulum hyaline, very minutely parenchymatous; asci broadly clavate, apex slightly narrowed, base rather stout, often rather deformed or irregular, 8-spored; spores irregularly 2-seriate, hyaline, smooth, continuous, narrowly elliptic-oblong, or slightly widest above the middle and with a clavate tendency, ends obtuse, often 2-guttulate, 15-20  $\times$  6-8  $\mu$ ; paraphyses filiform, hyaline, about 2  $\mu$  thick, apex not thickened, sometimes branched.

*Phacidium calthae*, Phil., *Grev.*, viii. p. 103; Phil., *Brit. Disc.*, p. 391; Sacc., *Syll.*, viii. n. 2951.

On fading leaves of *Caltha palustris*.

Authentic specimen from Phillips examined.



**Pseudopeziza medicaginis.** Sacc., Fung. Ard., n. 96 ; Syll., viii. n. 2971.

Sessile, innate, erumpent, girt by the ruptured epidermis, seated on yellowish spots; soon becoming almost plane, yellowish-brown, thin and delicate, glabrous, about  $\frac{1}{3}$  mm. across; excipulum parenchymatous; asci clavate, apex narrowed, stipitate, 8-spored; spores irregularly 2-seriate, hyaline, continuous, elliptical,  $8-11 \times 4-5 \mu$ , straight; paraphyses hyaline, slender, slightly thick at the tips.

*Phacidium medicaginis*, Libert, Crypt. Ard., exs., n. 176.

On the upper surface of living or fading leaves of various species of *Medicago*. Saccardo says also on *Trigonella*.

Closely allied to *P. trifolia*; distinguished by the somewhat smaller spores, and different host plant. Specimens of this species are in the Kew herbarium, collected by Baxter, near Oxford, and by the Rev. J. E. Leefe at Audley End, Essex.

Specimen in Libert's exs. n. 176, examined.

**Pseudopeziza radians.** Sacc., Syll., viii. n. 2974.

Erumpent and bordered by the torn epidermis, blackish and glabrous externally, concave then almost or quite plane, up to  $\frac{3}{4}$  mm. across, circular or slightly elongated, disk pallid or dingy; scattered, or more frequently gregarious and forming fine black, straight, radiating, or dendritic lines; excipulum parenchymatous, cells small, externally brownish-olive; asci cylindric-clavate, apex rather narrowed, often irregularly nodulose at or near the base, 8-spored; spores 2-seriate, narrowly cylindric-clavate, or cylindrical and only very slightly wider near the apex, ends obtuse, hyaline, continuous,  $8-10 \mu$  long,  $3-3.5 \mu$  across at the widest part; paraphyses rather stout, cylindrical, straight, about  $3 \mu$  thick.

*Phacidium radians*, Roberge, Ann. Sci. Nat., ser. ii., vol. xvii. p. 116; Phil., Brit. Disc., p. 388.

On both surfaces of living leaves of *Campanula patula*, *C. rapunculus*, and other species of *Campanula*.

Specimen sent by Roberge to Berkeley, examined, also specimen from Desm., Cr., Fr., ser. i., n. 1350.

**Pseudopeziza repanda.** Sacc., Syll., n. 2983.

Gregarious; innate, roundish,  $\frac{1}{2}-1$  mm. broad, convex, dingy pale green, then blackish, splitting from the centre

into 4-5 blunt teeth, disc dingy brown; asci cylindric-clavate; spores 8, irregularly biseriata, very narrowly clavate, ends obtuse, straight or very slightly curved, continuous, hyaline, usually with two large guttulae,  $10-13 \times 2.5-3 \mu$ ; paraphyses cylindrical,  $3 \mu$  thick, colourless.

*Phacidium repandum*, Fries, Vet. Akad. Handl., p. 108; Phil., Brit. Disc., p. 395.

*Phacidium vernale*, Fekl., Symb. Myc., pt. iv. b 262, tab. iv. f. 27.

*Phacidium autumnale*, Fekl., Symb. Myc., p. 262, tab. iv. f. 26.

Spermogonia, spermatia cylindrical, almost straight, colourless, continuous,  $6 \times 1.5 \mu$ .

*Phyllachora punctiformis*, Fekl., Symb. Myc., p. 219, Nachtr. ii. p. 52.

On the under side of living leaves of *Galium boreale*, *G. mollugo*, *Asperula odorata*, &c., less frequent on the stem.

It is suspected, but not definitely ascertained, that the following is the spermogonia condition of this species.

Stroma occurring on both surfaces of the leaf, minute, somewhat circular in outline,  $\frac{1}{2}$  mm. diameter, black, with many internal, minute conceptacles, furnished with slender brown hyphae at the base; texture parenchymatous, sooty; spermatia rod-shaped,  $30-40 \times 1.5-2 \mu$ , ends rather obtuse, 5-6-guttulate, hyaline.

*Placosphaeria stellatarum*, Sacc., Mich., ii. p. 353; Sacc., Syll., vol. iii. n. 1437.

On living leaves of *Galium* and *Sherardia*.

***Pseudopeziza alismatis*.** Sacc., Syll., viii. n. 2986.

Ascophores seated on brown discoloured spots, gregarious, at first closed and covered, orbicular, then bursting through the epidermis and opening with a lacerated thin margin, umber-brown when moist, black when dry; disc paler, plane,  $100-300 \mu$  across; asci broadly clavate,  $50-60 \times 10 \mu$ ; spores 8, oblong, polari-guttulate,  $10-14 \times 3-4 \mu$ ; paraphyses slenderly filiform.

*Mollisia* (*Pseudopeziza*) *alismatis*, Phil. & Trail, Grev., vol. xvi. p. 93.

On both sides of fading leaves of *Alisma plantago*. Sept., Oct.

Not examined.

**Pseudopeziza petiolaris.** Mass.

Ascophore minute, developing under the epidermis, its presence indicated by a pale grey spot, then emerging through an elongated slit, or less frequently through a stellate rupture with 3-4 teeth; often longish, marginate, yellowish-grey, soft,  $\frac{1}{2}$ -1 mm. across; asci clavate, small, 8-spored; spores cylindric-clavate, obtuse, straight, continuous, hyaline, smooth, biseriate,  $6-9 \times 1\frac{1}{2}-2\frac{1}{2} \mu$ ; paraphyses filiform, septate, becoming gradually thicker upwards,  $3 \mu$  thick at the apex, colourless.

*Peziza erumpens*, Grev., Scot., Cr. Fl., t. 99.

*Hysterium petiolare*, Albert. & Schweinitz, Comp. Fung. Nisk., p. 59.

*Mollisia erumpens*, Phil., Brit. Disc., p. 197.

*Mollisia petiolaris*, Sacc., Syll., viii. n. 1460.

*Trochila petiolaris*, Rehm, Krypt.-Flora, Disc., p. 132.

On dead petioles of leaves of sycamore and horse chestnut.

Resembling a small *Hysterium* or *Lophodermium* to the naked eye.

\*\* On herbaceous stems and culms of Angiosperms.

**Pseudopeziza artemisiae.** Mass.

Gregarious or scattered, erumpent, sessile, at first closed and turbinate, then expanding until almost plane, up to 1 mm. across; disc pallid, externally dark brown, often with an olive tinge, margin pale; excipulum parenchymatous, cortical cells irregularly polygonal, dark brown, 6-8  $\mu$  diameter, smaller and paler at the margin; asci clavate, apex narrowed, base rather stout, 8-spored; spores obliquely 2-seriate, hyaline, continuous, narrowly elliptical, ends rather acute, straight or very slightly curved,  $7-11 \times 1.5-2 \mu$ ; paraphyses hyaline, about  $3 \mu$  thick at the slightly thickened tips.

*Peziza artemisiae*, Lasch, in Rab., Herb. Myc., n. 335.

*Mollisia artemisiae*, Phil., Brit. Disc., p. 188.

*Pyrenopeziza artemisiae*, Rehm, Ascom., exs., n. 66; Rehm, Krypt.-Flora, Disc., p. 616; Sacc., Syll., viii. n. 1484.

On dead stems of *Artemisia vulgaris*.

Specimens examined in Rabenh., Herb. Myc., ed. ii. n. 623 (collected by Lasch); and Rehm, Ascom., n. 66.

**Pseudopeziza paulula.** . Mass.

Scattered or usually gregarious, erumpent, minute,  $\frac{1}{4}$ – $\frac{1}{3}$  mm. across, glabrous, closed at first, then expanding and concave; disc pale, margin whitish, entire, externally blackish with an olive tinge, surrounded at the base, especially when young, by a narrow white zone of hyphae which spring from the basal cortical cells; cortex parenchymatous, cells irregularly polygonal, 7–10  $\mu$  diameter, arranged in a parallel series, and pale at the margin; asci broadly elliptical, usually rather broadest near the base, apex rather narrowed, sessile or very nearly so, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly elliptic-oblong, ends rather blunt, often 2-guttulate,  $12\text{--}14 \times 4\text{--}5 \mu$ ; paraphyses slender, hyaline, almost cylindrical.

*Peziza paulula*, Roberge, in Desm., Cr. Fr., ed. i. n. 2010.

*Mollisia paulula*, Phil., Brit. Disc., p. 186; Sacc., Syll., viii. n. 1437.

On dead culms of *Juncus maritimus* and other species.

Specimen from Roberge examined, also Desm., n. 2010.

**Pseudopeziza graminis.** Mass.

Erumpent, sessile, gregarious or scattered, emerging through a slit in the epidermis of the host-plant and becoming elliptical or circular, margin raised, whitish and minutely villose; disc pale grey, externally greyish-brown, glabrous, often slightly wrinkled, about 1 mm. diameter; cortex parenchymatous, cells brownish below, polygonal, somewhat elongated from base to margin, becoming narrower upwards, and running out into distinct, pale, obtuse hyphae,  $40\text{--}65 \times 4\text{--}5 \mu$ , to form the pilose margin; asci cylindric-clavate, apex narrowed, base stout, 8-spored; spores irregularly 2-seriate, narrowly elliptic-oblong or slightly clavate, hyaline, continuous,  $12\text{--}16 \times 3\text{--}3.5 \mu$ ; paraphyses slender, hyaline, slightly thickened at the tip.

*Mollisia graminis*, Phil., Brit. Disc., p. 185.

*Peziza graminis*, Desm., Cr. Fr., ser. i. n. 1066.

On dead grass stems.

Specimen in Desm., Cr. Fr., ser. i. n. 1066, examined.

The specimen called *Belonium graminum*; Sacc., Syll., viii. n. 2034, considered to be the present species, differs in the 3-septate spores, septate paraphyses, &c.

**Pseudopeziza arenivaga.** Mass.

Scattered or gregarious, erumpent, soft, glabrous, at first globose, soon becoming plane, about 1 mm. across; disc whitish, dark when dry, externally brown, margin entire; cortex parenchymatous, cells irregularly polygonal, becoming parallel at the margin, everywhere dark brown, 8–12  $\mu$  diameter; asci stout, cylindric-clavate, apex slightly narrowed, base usually abruptly contracted into a short, oblique pedicel, 8-spored; spores irregularly 2-seriate, hyaline, continuous, elliptic-oblong, ends rather obtuse, straight or slightly curved, 14–16  $\times$  5–6  $\mu$ ; paraphyses slender, hyaline, tips slightly thickened.

*Peziza arenivaga*, Desm., Ann. Sci. Nat., 1852.

*Mollisia arenivaga*, Phil., Brit. Disc., p. 186; Sacc., Syll., viii. n. 1423.

On dead culms and leaves of *Psamma arenaria*.

Specimen in Desm., Crypt. France, exs., ser. ii., n. 17, examined.

**Pseudopeziza euphorbiae.** Mass.

Scattered or gregarious, sessile, erumpent, at first globose and closed, then expanding, but the thickish margin generally remaining upturned; disc whitish, externally dark brown, glabrous, about  $\frac{1}{2}$  mm. across; excipulum parenchymatous, cortical cells irregularly polygonal, smoky olive, 6–9  $\mu$  diameter; asci clavate, apex rounded, rather abruptly narrowed into the pedicel, 8-spored; spores irregularly 2-seriate, hyaline, continuous, smooth, broadly elliptical, 8–9  $\times$  6–7  $\mu$ ; paraphyses hyaline, about 2.5  $\mu$  thick, thickened at the tips.

*Peziza euphorbiae*, B. & Br., Ann. Nat. Hist., n. 1829, p. 212 (1879).

*Mollisia euphorbiae*, Phil., Brit. Disc., p. 198.

*Patinella euphorbiae*, Sacc., Syll., viii. n. 3171.

On stems of *Euphorbia amygdaloides*.

Authentic specimen examined.

This species is placed by Saccardo in the genus *Patinellea*, in Patellariaceae, but it is erumpent, and as remarked by Berkeley and Broome, "belongs clearly to the same section as *P. cerastiorum*."

**Pseudopeziza simulata.** Mass.

Ascophore erumpent, narrowly elliptical, about  $\frac{2}{3}$  mm. long, the sides at first rolled in, leaving a narrow slit like some *Hysterium*, then expanding and forming an irregular margin, girt by the raised margin of the ruptured epidermis: blackish olive externally, cells of the excipulum parenchymatous, rather small, external ones olive; disc slightly concave, reddish-brown or greyish with an olive tinge; asci cylindric-clavate, attenuate below; spores 8, obliquely uniseriate, smooth, hyaline, slightly obovate, eguttulate.  $9-10 \times 4-5 \mu$ ; paraphyses numerous, filiform,  $1\frac{1}{2} \mu$  thick, apex clavate, mostly longer than the asci.

*Phacidium simulatum*, B. & Br., Ann. Nat. Hist., ser. iii. vol. vii., p. 13 (n. 967), pl. xvi. f. 20; Phil., Brit. Disc., p. 390; Sacc., Syll., n. 2943.

On dead stems of *Clinopodium*. Dr. Quelet has found the same species in France on *Lycopus europaeus*.

Scattered: narrowly elliptical, elongated in the direction of the long axis of the stem. The figure by Berkeley and Broome represents the disc as being circular, which is not the case; the torn raised margin in the drawing represents the epidermis of the plant, and not the margin of the fungus.

The type specimen examined.

**Pseudopeziza rubi.** Mass.

Gregarious, erumpent, then becoming almost superficial, surrounded by the torn epidermis, at first closed then becoming almost plane, concave and marginate when dry, blackish, glabrous, soft when moist, becoming rather horny when dry,  $\frac{1}{3}-\frac{3}{4}$  mm. across; excipulum parenchymatous, cortical cells irregularly polygonal,  $6-9 \mu$  diameter, blackish-olive, running parallel towards the margin; asci clavate, apex narrowed and the wall thickened, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly cylindrical or with a slight tendency to become clavate, straight,  $7-9 \times 1.5-2 \mu$ ; paraphyses hyaline, slightly thickened at the apex, which is often inclined to be lanceolate.

*Excipula rubi*, Fries, Syst. Myc., ii. p. 190.

*Pyrenopeziza rubi*, Rehm., Krypt.-Flora, Disc., p. 611, figs. 1-5, p. 604; Sacc., Syll., n. 1489.



*Cenangium rubi*, Phil., Brit. Disc., p. 350? If the spore measurements given by Phillips are correct— $7-8 \times 5 \mu$ —it is doubtful whether he had the right plant in view.

On dead stems of various species of raspberry, bramble, &c.

Specimen in Fries' Scler. Suec., n. 101, examined; also Cooke, Brit. Fung., exs., ed. ii., n. 196, and Rehm, Ascom., nos. 416 a-c.

### **Pseudopeziza Browniana. Mass.**

Scattered, erumpent, broadly sessile, at first quite closed then expanding and becoming hemispherical, margin erect, irregularly fimbriate, whitish, incurved when dry, fleshy, 1 mm. across; externally pale ochraceous-brown, glabrous; disc concave, pallid; excipulum parenchymatous, external cells polygonal, 9-12 diameter, rather thick walled, brown, running out in irregular groups at the margin, and behind these groups, as viewed from the exterior, are short, septate, cylindrical, obtuse, tinted or hyaline hairs  $30-50 \times 4 \mu$ , springing from the inner layers of the excipulum; asci cylindric-clavate, apex rather narrowed, 8-spored; spores irregularly uniseriate, or sometimes more or less 2-seriate near the top of the ascus, narrowly elliptic-fusiform, the apex sometimes rounded, and then becoming elongated clavate, often very slightly curved, hyaline, for a long time continuous, then 2-guttulate, and finally 1-septate, smooth; paraphyses numerous, filiform, apex clavate or fusiformly thickened, hyaline.

*Peziza Browniana*, Bloxam, in B. & Br., Ann. Nat. Hist., n. 1072; Phil., Brit. Disc., p. 408.

*Mollisia? Browniana*, Sacc., Syll., viii. n. 1355.

On dead stems of *Epilobium hirsutum*.

Type specimen examined.

### **Pseudopeziza palustris. Mass.**

Scattered or gregarious, erumpent, sessile, closed and globose at first, then expanding and becoming plane and discoid, margin sometimes wavy; disc pallid or greyish, externally brownish, glabrous,  $\frac{1}{2}-\frac{3}{4}$  mm. across; excipulum parenchymatous, cortical cells towards the base irregularly polygonal, smoky-olive, 9-12  $\mu$  diameter, becoming elongated and narrower upwards, running out at the margin into parallel, paler, obtuse, septate hyphae; brown septate



hyphae, about  $4\ \mu$  thick, spring from the basal cells of the cortex, and are sometimes sufficiently numerous to form a more or less evident, blackish tapesium; asci narrowly clavate, apex rather pointed, 8-spored, spores irregularly 2-seriate, hyaline, continuous, narrowly cylindric-fusoid, or broadest near the apex and inclined to become clavate, often slightly curved,  $7-10 \times 1.5-2\ \mu$ ; paraphyses hyaline, septate, slender, sometimes forked.

*Peziza palustris*, Roberge, Ann. Sci. Nat., 1847, p. 187.

*Mollisia palustris*, Karst., Myc. Fam., p. 195; Phil., Brit. Disc., p. 189; Sacc., Syll., viii. n. 1431.

*Mollisia Curreiana*, Phil., Brit. Disc., p. 406.

*Mollisia Curreyana*, Sacc., Syll., viii. n. 1439.

*Patellaria palustris*, Currey, Linn. Trans., xxiv. p. 155, tab. 25.

On dead stems and leaves of species of *Juncus*.

Specimen sent by Roberge to Berkeley examined, also specimen in Desm., Cr. Fr., ser. i., n. 1543.

Currey's type of *Patellaria palustris*, made into a new species—*Mollisia Curreiana*—by Phillips, proves on examination to be identical with *Peziza palustris* of Roberge.

### **Pseudopeziza sphaeroides. Mass.**

Scattered or gregarious, erumpent, sessile, at first globose and closed, then expanded, but the margin remaining erect,  $\frac{1}{4}-\frac{1}{2}$  mm. across; disc watery-grey, every part blackish when dry; asci cylindric-clavate, apex slightly narrowed, almost sessile, 8-spored; spores hyaline, smooth, continuous, cylindrical, ends rather pointed, straight or very slightly curved, irregularly 2-seriate,  $10-15 \times 1.5$ ; paraphyses hyaline, slender, tips slightly thickened.

*Peziza sphaeroides*, Desm., Crypt. France, exs., n. 174.

*Mollisia sphaeroides*, Phil., Brit. Disc., p. 187.

*Pyrenopeziza sphaeroides*, Sacc., Syll., viii. n. 1504.

On dead stems of *Lychnis dioica*.

Minute, scattered, generally seated on a cinereous stain on the stem.

Specimens examined from Desm., Cr. Fr., n. 174; Cooke, Fung. Brit., n. 577, and Phil., Elv. Brit., n. 34.

### **Pseudopeziza foecunda. Mass.**

Scattered or gregarious, erumpent, sessile, globose at first,

expanding and becoming concave, then plane, sooty-brown, the margin paler; excipulum parenchymatous, basal cortical cells irregularly polygonal, brown, 9–13  $\mu$  diameter, becoming smaller upwards, and running out at the margin into parallel rows of obtuse, pale, septate hyphae; about  $\frac{1}{2}$  mm. diameter; asci broadly cylindric-clavate, apex slightly narrowed, almost sessile, 8-spored; spores hyaline, irregularly 2-seriate, narrowly elliptic-fusiform, 3–4 guttulate, finally 1-septate, 25–28  $\times$  4–5  $\mu$ ; paraphyses hyaline, about 2  $\mu$  thick, somewhat clavate.

*Peziza (Mollisia) foecunda*, Phil., Grev., viii. p. 102.

*Mollisia foecunda*, Phil., Brit. Disc., p. 189.

*Pyrenopeziza foecunda*, Sacc., Syll., viii. n. 1523.

On dead stems of *Eleocharis*.

Specimen in Phil., Elv. Brit., n. 184, examined.

### **Pseudopeziza trifolii.** Mass.

Gregarious or scattered, erumpent, sessile, soon becoming plane, margin minutely fimbriate; dingy orange; about  $\frac{2}{3}$  mm. diameter; excipulum parenchymatous, cells small, becoming elongate and narrow upwards, and running out at the margin into hyphae of irregular lengths; asci clavate, apex broadly rounded, becoming gradually contracted into a slender pedicel, curved, 4-spored; spores hyaline, smooth, continuous, elliptical, 1-seriate, straight, 11–14  $\times$  6–7  $\mu$ ; paraphyses hyaline, slender below, upper half gradually becoming clavate, 3–4  $\mu$  thick at the top, often curved or hooked, rather longer than the asci, sometimes forked.

*Peziza (Mollisia) trifolii*, B. & Br., Ann. Nat. Hist., n. 1623 (Feb., 1876.)

*Peziza (Mollisia) ulcerata*, Phil. & Plow., Grev., vol. iv. p. 122, pl. 62, fig. v. (March, 1876.)

*Calloria ulcerata*, Phil. & Plow., Brit. Disc., p. 330.

*Orbilbia ulcerata*, Sacc., Syll., viii. n. 2595.

On dead stems of *Aster trifolium*.

Minute, erumpent, surrounded by the blackened cuticle, which often splits into tooth-like laminae. Hymenium orange. Paraphyses flexuous, sometimes forked. (B. & Br.)

Berkeley's type specimen examined, also Phil., Elv. Brit., n. 83.

\*\*\* On branches of trees and shrubs.

**Pseudopeziza albella.** Mass.

Erumpent, bursting through the bark in clusters of 4-6, rarely solitary, discoid and almost plane, but usually irregular, due to mutual pressure, sometimes narrowed into a very short, stem-like base, glabrous, thin, whitish or with a tinge of yellow, about  $\frac{2}{3}$  mm. across; cortical cells very narrow and much elongated from base to margin; asci narrowly clavate, pedicel slender, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly elliptic-oblong,  $6-8 \times 1.5-2 \mu$ ; paraphyses hyaline, slender, scarcely thickened at the apex, sometimes forked.

*Peziza albella*, Withering, Arr., iv. p. 350.

*Mollisia vulgaris*, Gillet, Champ. Fr. Disc., p. 119; Phil., Grevillea, vol. xviii., p. 83.

*Pezizella vulgaris*, Sacc., Syll., viii. n. 1154.

Bursting through the bark on dry branches of hazel, sweet chestnut, &c.

Allied in habit to *P. benesueda*.

Specimen examined in Roum., Fung. Gall., n. 2819.

**Pseudopeziza ebuli.** Mass.

Gregarious or crowded, erumpent, globose and closed at first, then cup-shaped, finally almost plane and depressed, about  $\frac{1}{2}$  mm. across, disc greyish, externally glabrous, blackish-grey, margin paler; excipulum parenchymatous, cortical cells polygonal, brown, becoming elongated and narrow upwards, and running out into short, pale, parallel hyphae at the margin; altogether blackish when dry; asci broadly cylindric-clavate, apex narrowed, sessile on a broadish base, 8-spored; spores hyaline, continuous, irregularly 2-seriate, narrowly cylindric-fusoid or very slightly clavate,  $9-12 \times 2 \mu$ ; paraphyses sub-cylindrical, hyaline, about  $2 \mu$  thick.

*Peziza atrata*, var.  *$\beta$  ebuli*, Fries, Syst. Myc., ii. p. 148.

*Mollisia ebuli*, Phil., Brit. Disc., p. 187.

*Pyrenopeziza ebuli*, Sacc., Syll., viii. n. 1486.

On *Sambucus ebulus* and stems of willow-herb.

Specimen in Desm., Cr. Fr., ser. ii., n. 454, examined.

**Pseudopeziza benesueda. Mass.**

Ascophores erumpent, gregarious, or usually in clusters of 2-4 and much contorted from lateral pressure, sessile, at first closed, then expanding until the disc is plane, externally greyish or olive, disc pallid, glabrous, somewhat waxy,  $\frac{1}{2}$ - $1\frac{1}{2}$  mm. across; hypothecium and excipulum parenchymatous, hyaline, cortical cells olive-brown, 8-12  $\mu$  diameter; asci narrowly clavate, apex narrowed, 8-spored; spores 2-seriate, hyaline, continuous, narrowly elliptic-fusiform, straight or slightly bent,  $8-10 \times 2-2.5 \mu$ ; paraphyses straight, rather stout, septate, hyaline, apex slightly thickened.

*Peziza benesueda*, Tul., Ann. Sci. Nat., 1853, p. 169, pl. xv. figs. 8-9.

*Mollisia benesueda*, Phil., Brit. Disc., p. 174; Rehm, Krypt.-Flora, Dist., p. 513, figs. 1-6, p. 505; Sacc., Syll., viii. n. 1381.

On dead branches of alder.

Tulasne has shown that in some ascophores the peripheral portion of the disc bears normal asci, whereas the central portion is mostly occupied by very slender, forked hyphae bearing delicate rod-like spermatia at the tips of the branches.

Cups about  $\frac{1}{2}$  a line broad. These burst out through the bark in little heaps, much crowded and deformed. The supposed spermatia are rarely to be met with. This is very near *M. cinerea* and *M. fallax*. (Phillips.)

Specimens examined in Phil., Elv. Brit., n. 175; Rehm, Ascom., 756.

**Pseudopeziza discolor. Mass.**

Erumpent, clustered in groups of 3-5, sessile, closed at first, then expanding, the disc becoming almost or quite plane and patellate, fixed by a central point, margin thin, sometimes wavy, contorted when dry, glabrous, disc honey-coloured, externally brown,  $1-1\frac{1}{2}$  mm. across; excipulum formed of interwoven, hyaline hyphae that gradually pass into a parenchymatous cortex of olive cells, 10-14  $\mu$  diameter; asci narrowly clavate, apex narrowed, pedicel stout, often bent at the base, 8-spored; spores 2-seriate, hyaline, continuous, narrowly fusiform, straight, or rarely slightly bent,  $10-12 \times 2.5 \mu$ ; paraphyses straight, hyaline,

about  $2\ \mu$  thick, apex slightly thickened, equal to the asci in length.

*Patellaria discolor*, Mont., Syll., p. 190.

*Mollisia discolor*, Phil., Brit. Disc., p. 175; Sacc., Syll., viii. n. 1386.

*Niptera discolor*, Rehm, Krypt.-Flora, Disc., p. 552.

*Niptera riccia*, Sacc., Myc. Ven. Spec., p. 162, t. xvi. figs. 3-6.

*Mollisia riccia*, Sacc., Syll., viii. n. 1395.

*Mollisia discolor*, var. *riccia*, Phil., Brit. Disc., p. 175.

Specimen sent by Montagne to Berkeley, and now in Kew Herbarium, examined; also specimen of *Niptera riccia* from Saccardo.

On branches of *Cornus sanguinea*, and on wood.

Allied to *P. benesueda*, but readily separated by the structure of the excipulum. The margin is as much lobed in some of the specimens from Montagne, as in Saccardo's specimen.

### \*\*\* On Gymnosperms.

***Pseudopeziza retrusa*.** Mass. (figs. 43, 44, p. 156).

Scattered, very minute, not more than  $\frac{1}{3}$  mm. across, erumpent, sessile, at first concealed by the epidermis, hemispherical and closed, then almost plane, straw-colour, glabrous, rather fleshy, soft; excipulum parenchymatous, cortical cells  $6-8\ \mu$  diameter; asci clavate, apex rounded, 8-spored; spores irregularly 2-seriate, hyaline, continuous, smooth, elliptical, ends obtuse, straight,  $16-18 \times 5\ \mu$ ; paraphyses absent?

*Peziza retrusa*, Phil. & Plow., Grev., iv. p. 122, t. 62, fig. 6.

*Calloria retrusa*, Phil., Brit. Disc., p. 407.

*Orbilia retrusa*, Sacc., Syll., viii. n. 2597.

On dead larch leaves.

Specimen examined in Phil., Elv. Brit., n. 126.

When dry this is found with difficulty, being contracted and concealed under a kind of lid formed of the ruptured epidermis, but when moist it is sufficiently conspicuous under a pocket-lens. (Phillips.)

MOLLISIA. Fries. (emended). (figs. 18-23, p. 156).

Ascophore superficial, sessile, glabrous, minute; cortex parenchymatous; asci cylindric-clavate, apex usually narrowed, 4-8-spored; spores irregularly 2-seriate, elongated, narrowly elliptical or fusoid, smooth, hyaline, continuous or 1-septate; paraphyses present.

*Mollisia*, Fries, Syst. Myc., ii. p. 137; Phil., Brit. Disc., p. 171; Sacc., Syll., viii. p. 321 (all in part).

Epiphytic; growing on wood, herbaceous stems, leaves, fruits, &c.

Most closely allied to *Pseudopeziza*, but distinguished by the ascophore being superficial and not truly erumpent, as in the last-named genus. *Belonidium* differs in the 3-many-septate spores. *Humaria* differs in having the ascophore fleshy, and in growing on the ground.

\* *On wood, branches, or bark.*

### **Mollisia depressa.** Mass.

Gregarious or crowded, fixed by a central point, sessile, discoid, plane or slightly convex, margin scarcely raised, 3-4 mm. across; disc umber-brown, margin paler, glabrous; excipulum formed of septate, interwoven, hyaline hyphae, passing into true parenchymatous tissue at the cortex, cells mostly hexagonal, 14-20  $\mu$  across; asci cylindrical, 8-spored; spores 1-seriate, hyaline, continuous, often 1-2-guttulate, elliptical, ends obtuse, 18-21  $\times$  12-13  $\mu$ ; paraphyses septate, clavate, 7-8  $\mu$  thick at the brownish tip.

*Peziza depressa*, Phil., in Mycogr., fig. 392; Brit. Disc., p. 101.

*Humaria depressa*, Sacc., Syll., viii. n. 578.

On dead branches of willow on damp ground.

Authentic specimen from Phillips examined.

Cup 1-2 lines broad. This adheres to the wood by a broadish base, and while moist the whole under side is pressed against the wood. The disc is convex; the margin acute, and a little paler. (Phillips.)

The dry specimens after soaking were whitish or pallid.



**Mollisia aquosa.** Phil., Brit. Disc., p. 172; Sacc., Syll., viii. n. 1382.

Scattered, sessile, at first globose and closed, then expanding until slightly concave or almost plane, glabrous; disc pallid or pale grey, externally brown with an olive tinge, about  $\frac{1}{2}$  mm. across; excipulum parenchymatous, cortical cells brown, irregularly polygonal, 8–10  $\mu$  diameter; asci narrowly clavate, 8-spored; spores hyaline, continuous, smooth, elliptical, ends rather acute,  $5-6 \times 3-3.5 \mu$ , 2-seriate, or almost 1-seriate; paraphyses slender, hyaline, tips not thickened.

*Peziza (Mollisia) aquosa*, B. & Br., Ann. Nat. Hist., n. 1326, ser. iv., vol. vii. p. 18, t. xx., fig. 19.

Growing on *Lasiosphaeria hirsuta*, on willow branches.

Allied to *M. cinerea*, but the ascophore is smaller, and the spores shorter and broader.

Type specimen examined.

**Mollisia lignicola.** Phil., Grev., xv. p. 113; Brit. Disc., p. 180; Rehm., Krypt.-Flora, Disc., p. 522.

Gregarious or scattered, sessile, globose and closed at first, then expanding and becoming only very slightly concave, margin somewhat irregular; disc pallid, externally blackish-brown, rough with minute points due to projecting groups of cells, and vertically wrinkled, about  $\frac{3}{4}$  mm. across; excipulum parenchymatous, cortical cells irregularly polygonal, brown, 8–10  $\mu$  diameter, running out into parallel rows of septate, obtuse hyphae at the margin; asci clavate, apex rounded, 8-spored; spores irregularly 2-seriate, narrowly cylindric-fusiform, straight or slightly curved, hyaline, continuous,  $6-9 \times 2-2.5 \mu$ ; paraphyses slender, hyaline, about  $2.5 \mu$  thick at the tip.

*Pyrenopeziza lignicola*, Sacc., Syll., viii. n. 1511.

On old worked wood, decorticated trunks, &c.

Type specimen examined.

**Mollisia mali.** Phil., Brit. Disc., p. 194.

Gregarious, minute, nearly  $\frac{1}{4}$  mm. across, sessile, closed and globose, then expanding, margin incurved when dry, yellowish-green or sometimes almost honey-colour, thin and rather watery; excipulum parenchymatous, cells long and



very narrow, running out into parallel hyphae at the margin, the free portion of which measures about  $25-30 \times 3-4 \mu$ ; asci clavate, apex rounded, sometimes curved, 8-spored; spores irregularly 2-seriate, continuous, hyaline, straight or very slightly bent,  $8-10 \times 2.5-3 \mu$ ; paraphyses hyaline, cylindrical, slender.

*Pezizella mali*, Rehm, 26 Ber. Naturh. Ver. Augsb., p. 112.

*Pseudohelotium mali*, Sacc., Syll., viii. n. 1256.

On the inner surface of apple-tree bark; also, according to Phillips, on dead holly bark.

Specimen in Rehm, Ascom., n. 460, examined.

**Mollisia dentata.** Gillet, Champ. France, Disc., p. 124.

Scattered or gregarious, sessile, subglobose and closed at first, then becoming hemispherical, the slightly irregular margin remaining more or less erect, very thin, soft and watery, whitish, or with a yellow tinge, about  $\frac{1}{2}$  mm. diameter; hypothecium and excipulum minutely parenchymatous, cortical cells irregularly polygonal, running out in irregular groups to form the toothed border, and passing into parallel, obtuse hyphae at the margin  $25-40 \times 4-5 \mu$ , sometimes rough with minute particles of lime; asci clavate, pedicel long, slender, apex narrowed, 8-spored; spores obliquely 1-seriate, or 2-seriate at the apex, hyaline, continuous, smooth, narrowly clavate,  $8-10 \times 3 \mu$ ; paraphyses numerous, very slender, sometimes branched, tips not thickened.

*Pezizia dentata*, Pers., Icon. et Descr. Fung., p. 5, t. 1, figs. 6, 7.

*Niptera dentata*, Fekl., Symb. Myc., p. 335.

*Cyathicula dentata*, Sacc., Syll., viii. n. 1283.

*Pezizella dentata*, Rehm, Krypt.-Flora, Disc., p. 659.

On rotten wood.

Specimen in Fuckel's Fung. Rhen., n. 2379 examined.

The species described by Phillips, Brit. Disc., p. 334, as *Calloria rubella*, Pers., is certainly not the fungus intended by Persoon. The specimen accepted by Phillips is from "Herb. Berkeley," and the only specimen in Berkeley's herbarium under the name of *Peziza dentata*, Pers., is an imperfectly developed *Orbilina*, probably *O. leucostigma*.

Approaching the genus *Cyathicula* in the minutely dentate margin of the ascophore, but differing in the soft, watery substance of the ascophore, and in being sessile.

**\*\* On leaves, herbaceous stems, and culms.**

**Mollisia atrocinerea.** Phil., Brit. Disc., p. 176; Rehm, Krypt.-Flora, Disc., p. 530; Sacc., Syll., n. 1334. (figs. 18-23, p. 156.)

Scattered or gregarious, sessile on a broad base, very thin and soft, soon becoming quite plane and with a very narrow, slightly raised, dark brown margin, which is often wavy; excipulum smooth, dark olive brown, parenchymatous, cells olive, irregularly polygonal, 6-9  $\mu$  diameter, becoming arranged in parallel, septate series and a little paler at the margin; disc plane, pale pearly-grey when moist; up to  $\frac{1}{3}$  mm. across; asci cylindric-clavate, base thickish, 8-spored; spores biseriate, continuous, smooth, hyaline, straight or slightly curved, cylindrical or with a slight tendency to become clavate or fusiform, 6-8  $\times$  1.5-2  $\mu$ ; paraphyses cylindrical, hyaline, about 2 mm. thick.

*Peziza atrocinerea*, Cooke, Brit. Fung., ser. i., exs., n. 382.

*Peziza atrata*, var. *polygoni*, Cke., Brit. Fung. i. 284.

On stems of *Polygonum* (Cooke's type) in Britain. Said to have occurred on *Galium*, *Rumex acetosa*, *Oenothera biennis*, *Sium latifolium*, *Anthriscus sylvestris*, *Valeriana officinalis*, *Dipsacus*, and *Solidago* on the continent.

Type specimen examined.

The present species appears to be identical with *Mollisia polygoni*, Rehm, Krypt.-Flora, Disc., p. 527. I can find no difference between Rehm, Ascom., nos. 70 a-c, and Cooke's type specimen.

**Mollisia atrata.** Karsten, Myc. Fenn., i. p. 200; Phil., Brit. Disc., p. 181; Rehm, Krypt.-Fl., Disc., p. 529.

Gregarious, sessile, at first globose and closed, then cup-shaped, finally almost plane, about  $\frac{1}{2}$  mm. across; hymenium whitish or pale-grey, externally glabrous, often more or less distinctly vertically wrinkled, brown with an olive tinge or greyish, margin paler; excipulum parenchymatous, cells of cortex polygonal or almost circular near the base, 6-8  $\mu$

diameter, becoming smaller upwards, and running out at the margin into very short, obtuse, septate, parallel, pale hyphae; asci clavate, apex narrowed, pedicel short, stout 8-spored; spores hyaline, very narrowly fusiform, subcylindrical, or with a tendency to become slightly clavate, irregularly 2-seriate, straight,  $6-10 \times 1.5-2 \mu$ ; paraphyses hyaline,  $2 \mu$  thick at the tip.

*Peziza atrata*, Pers., Syn. Fung., p. 669.

*Mollisia atrata*, vars. *asparagi*, *oenanthes*, and *ulmariae*, Phil., Brit. Disc., p. 182.

On dead stems of herbaceous plants; asparagus, dropwort (*Oenanthe*), willow-herb, evening primrose, ragwort, &c.

Specimens examined in Moug. and Nestler, Stirp. Vog., n. 1190.

Distinguished from *M. mercurialis* in the glabrous ascophore, and from *M. cinerea* in not growing on wood.

*Var. eupatoricola*: Phil., Elv. Brit., exs., n. 179 (called *Peziza atrata*, forma *eupatoricola*).

Spores straight or slightly curved, narrowly fusiform, sometimes becoming 1-septate,  $10-18 \times 2 \mu$ ; paraphyses hyaline, rather stout, slightly thickened upwards; remainder as in typical form.

On dead stems of *Eupatorium cannabinum*.

Specimen examined in Phil., Elv. Brit., n. 179.

***Mollisia mercurialis***. Sacc., Syll., viii. n. 1350; Rehm, Krypt. Flora, Disc., p. 528.

Ascophores scattered or gregarious, sessile, closed and almost globose at first, then becoming saucer-shaped; disc greyish, margin erect, whitish, minutely fimbriate, externally olive-brown or blackish, rough with minute raised points consisting of outgrowths of the cortical cells;  $\frac{1}{3}-\frac{2}{3}$  mm. across; excipulum parenchymatous, cortical cells irregular, polygonal and sooty-olive near the base,  $7-8 \mu$  diameter, running out at the margin into free, septate, obtuse hyphae of different lengths and forming the fimbriate margin; asci clavate, apex rather narrowed, base stout, obliquely truncate, 8-spored; spores hyaline, continuous, very narrowly fusiform or subcylindrical, straight or slightly curved, 2-seriate,  $7-10 \times 1.5 \mu$ ; paraphyses slender, hyaline,  $3 \mu$  thick at the broadened tip.

*Peziza mercurialis*, Fckl., Fung. Rhen., n. 1593.

*Mollisia atrata*, var. *mercurialis*, Phil., Brit. Disc., p. 183.

On dead stems of mercury (*Mercurialis perennis*)

Specimen examined in Fuckel's Fung. Rhen., n. 1593, and Phil., Elv. Brit., n. 180.

Closely allied to *M. atrata*; differing more especially in the margin and exterior of the ascophore, the structure of which leans towards *Dasyscypha*.

***Mollisia teucriti***. Phil., Brit. Disc., p. 176.

Gregarious or crowded and sometimes several specimens run into each other, sessile, translucent, white with a tinge of yellow or ochre, soon plane, the margin very delicately pruinose at first; excipulum parenchymatous, cortical cells almost colourless, polygonal and about  $7\ \mu$  diameter near the base, becoming narrower upwards and running out into rows of parallel septate hyphae at the margin;  $\frac{1}{2}$ –1 mm. across; pale yellow and almost transparent when dry; asci narrowly clavate, apex narrowed, pedicel short, slender, 8-spored; spores irregularly 2-seriate, hyaline narrowly cylindrical, ends rather pointed, usually slightly curved,  $8 \times 1.5$ – $2\ \mu$ ; paraphyses slender, hyaline, tips very slightly thickened.

*Niptera teucriti*, Fckl., Symb. Myc., App., i. p. 47.

*Pseudohelotium teucriti*, Sacc., Syll., viii. n. 1228.

On dead stems of *Teucrium scorodonia*.

The appearance of the fungus under a lens suggests the genus *Calloria*, and it becomes very thin, and almost transparent, retaining its pale colour when dry. The above description is drawn up from specimens in Fuckel's Fung. Rhen., n. 2378—with which Rehm's Ascom. n. 757 is identical. I am not certain that Phillips had the right fungus in view; his own remarks "when dry nearly black: asci with a subglobose base," do not agree with Fuckel's specimens. Unfortunately I cannot find ascophores in either of the two sets of Phil.'s Elv. Brit., n. 177, said to be the present species.

***Mollisia urticicola***. Phil., Brit. Disc., p. 177; Sacc. Syll., viii. n. 1341.

Gregarious, sessile, at first globose and closed, finally becoming almost plane, glabrous; disc greyish or pale

brown, externally rufous-brown, about  $\frac{1}{3}$  mm. across; excipulum parenchymatous, cortical cells pale olive, polygonal, and about  $6-8\ \mu$  across near the base, becoming long and narrow upwards, and running out into free, parallel hyphae of various lengths to form the pale, irregular margin; asci almost cylindrical, apex narrowed, base truncate, hardly narrowed, 8-spored; spores hyaline, continuous, cylindric-fusoid,  $7-8 \times 1\ \mu$ , irregularly 2-seriate, paraphyses very slender, hyaline.

On dead nettle stems lying in very damp places.

Specimen in Phillips' *Elvell. Brit., exs., n. 177*, examined.

**Mollisia effugiens.** Phil., *Brit. Disc.*, p. 196.

Scattered or gregarious, very minute,  $\frac{1}{3}-\frac{1}{2}$  mm. across, sessile, globose and closed at first then concave, finally almost plane, ivory-white, almost translucent; margin white, minutely irregular; externally slightly pruinose, thin and delicate; excipulum delicately parenchymatous, cortical cells polygonal and about  $5\ \mu$  across near the base, becoming very narrow and elongated upwards, running into slender, parallel hyphae of various lengths at the margin; asci cylindric-clavate, apex narrowed, base truncate, scarcely constricted, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly cylindric-fusiform, straight or slightly bent,  $8-12 \times 1.5-2\ \mu$ ; paraphyses hyaline; about  $2\ \mu$  thick, apex somewhat pointed.

*Peziza effugiens*, Roberge, *Ann. Sci. Nat.*, 1853, p. 19.

*Pseudohelotium effugiens*, Sacc., *Syll.*, viii., n. 1225.

On dead stems of herbaceous plants, &c. Roberge's specimen is on dead stem of *Clematis erecta*.

Distinguished from allied species by the somewhat stout, very straight paraphyses with pointed tips. The ascophores burst through the cuticle, but are not truly erumpent.

Specimen from Roberge, now in *Herb. Berk.*, Kew, examined, also *Desm., Crypt. France, ser. ii., n. 16*.

**Mollisia digitalina.** Phil., *Brit. Disc.*, p. 190.

Scattered or crowded, sessile, at first globose and closed, then expanding and becoming concave; disc grey, externally quite glabrous, blackish, becoming pale towards the margin, about  $\frac{3}{4}\ \mu$  mm. across; excipulum parenchymatous, cortical cells polygonal, dark brown,  $7-9\ \mu$  diameter near the base,

becoming paler and smaller upwards, and ending in parallel, usually 1-septate, obtuse, pale hairs at the margin; asci cylindric-clavate, apex narrowed, base stout, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly elliptical, ends rather pointed, but sometimes inclined to be obtuse at one end,  $5-8 \times 1.5 \mu$ ; paraphyses slender, hyaline, very slightly thickened at the tips.

*Pyrenopeziza digitalina*, Sacc., Syll., viii., n. 1477.

On dead stems of foxglove.

Specimen examined in Phillips, Elv. Brit., n. 128 (called *Peziza atrata*, var. *digitalina*).

Phillips in his description of this species—Brit. Disc., p. 190—says it is externally squamulose, but I find his own specimens to be perfectly glabrous.

Var. *Smyrni*. Phil. & Plow., Brit. Disc., p. 192.

Gregarious, sessile, hemispherical then expanded, fleshy, glabrous, pale argillaceous; margin minutely fimbriate; asci cylindraco-clavate; spores 8, fusiform or cylindraco-fusiform, 3-guttulate,  $10-13 \times 3 \mu$ ; paraphyses filiform.

On dead stems of *Smyrnium*.

Differing very little from *M. dilutella* (Phil.).

Not seen.

*Mollisia dilutella*. Phil., Brit. Disc., p. 191, pl. vi. fig. 34.

Gregarious, sessile, globose and closed when young, then expanding, but the disc remains persistently concave and the whitish margin more or less incurved, glabrous and polished, greyish-white, becoming pale amber and translucent when dry, hypothecium formed of hyaline, anastomosing hyphae, excipulum hyaline, delicately parenchymatous, cortical cells irregularly polygonal,  $6-8 \mu$  diameter, becoming smaller upwards, and running out into almost hyaline, parallel hyphae at the margin; asci cylindric-clavate, apex narrowed, base stout, 8-spored; spores irregularly 2-seriate, hyaline, continuous, often slightly curved,  $8-11 \times 2 \mu$ , elliptical, ends rather acute; paraphyses slender, hyaline, slightly thickened at the tip.

*Pezizella dilutella*, Sacc., Syll., viii. n. 147.

On dead stems of *Epilobium angustifolium*, and *E. hirsutum*.

Specimen named by Desmazières examined.



**Mollisia viburnicola.** Phil., Brit. Disc., p. 185.

Ascophores gregarious, at first closed and subglobose, then expanding and remaining slightly concave,  $\frac{1}{2}$ – $\frac{3}{4}$  mm. across; disc greyish, externally darker, margin minutely granular, due to projecting cells, otherwise glabrous, blackish and concave when dry; excipulum distinctly parenchymatous, cortical cells irregularly polygonal, olive, 6–8  $\mu$  diameter, having a tendency to run in parallel rows at the margin, the tips becoming free; asci clavate, tip narrowed, 8-spored; spores 2-seriate, hyaline, smooth, continuous, very narrowly fusiform, straight or slightly curved,  $9\text{--}12 \times 1.5 \mu$ ; paraphyses hyaline, slightly clavate at the tips.

*Peziza viburnicola*, B. & Br., Ann. Nat. Hist., n. 1170 (1886).

*Pyrenopeziza viburnicola*, Sacc., Syll., viii. n. 1509.

On dead, fallen leaves of *Viburnum opulus*; most abundant on the under surface.

Type specimen examined; also specimen in Cooke's Fung. Brit., n. 656.

**Mollisia nervisequia.** Phil., Brit. Disc., p. 179, pl. vi. fig. 33.

Gregarious in rows, mostly on the veins of the leaf, sessile, subglobose and closed at first, indistinctly vertically wrinkled, then expanding until saucer-shaped; disc grey or blackish, externally blackish, glabrous, somewhat paler, irregularly contracted when dry, up to 1 mm. across; excipulum parenchymatous, hyaline, passing into large, olive-brown cells at the cortex, and arranged in parallel rows at the margin; asci clavate, tip narrowed, pedicel long, stout, 8-spored; spores irregularly 2-seriate, hyaline, continuous, elliptic-oblong, ends blunt,  $10\text{--}14 \times 3\text{--}4 \mu$ ; paraphyses hyaline, slender, numerous, tip somewhat thickened.

*Pyrenopeziza nervisequia*, Sacc., Syll., viii., n. 1501; Rehm, Krypt.-Flora, Disc., p. 629.

On dead leaves of *Plantago lanceolata*, especially on the veins. Winter.

Specimens in Moug. & Nest., n. 786, and Desm. Cr. France, ser. i., n. 2012, examined.

**Mollisia plantaginis.** Phil., Brit. Disc., p. 133.

Gregarious or scattered, sessile, at first appearing as a



minute, black, closed ball, then expanding, disc concave, pallid or brownish, glabrous and blackish outside, the somewhat incurved margin pale,  $\frac{1}{3}$ , rarely  $\frac{1}{2}$  mm. across; excipulum parenchymatous, cortical cells polygonal, brown, 7-9  $\mu$  diameter, whitish and arranged in a parallel series at the margin; asci cylindrical, or sometimes with a very slight clavate tendency, apex narrowed, almost sessile, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly cylindrical, ends obtuse, straight or slightly bent, 14-18  $\times$  3.5  $\mu$ , paraphyses slender, hyaline, slightly thickened at the tips.

*Pyrenopeziza plantaginis*, Sacc., Syll., viii. n. 1500; Rehm, Krypt.-Flora, Disc., p. 625.

On dead leaves of *Plantago lanceolata*.

Distinguished from *M. nervisequia* by the smaller ascophores being scattered over the surface of the leaf, and not mostly confined to the veins; the shorter, cylindrical, sessile asci, the longer spores, and the smaller cortical cells.

Specimen in Phil., Elv. Brit., n. 37, examined.

**Mollisia juncina.** Rehm, Krypt.-Flora, Disc., p. 545; Sacc., Syll., viii. n. 1433.

Gregarious, sessile, subglobose and closed at first, then expanding until most or quite plane, contracted when dry; disc yellowish or greyish, externally yellowish then brown, altogether blackish when dry, up to  $\frac{3}{4}$  mm. across; excipulum parenchymatous, cortical cells narrow and elongated towards the pale margin; asci clavate, apex narrowed, 8-spored; spores hyaline, cylindric-fusoid, straight, continuous, usually with 2 minute oil-globules, 9-10  $\times$  1-1.5  $\mu$ , 2-seriate; paraphyses slender, somewhat branched above, tips not much thickened, yellowish.

*Peziza juncina*, Pers., Myc., Eur., i. p. 314.

*Mollisia melatephra*, Sacc., Mich., ii. p. 81; Phil., Brit. Disc., p. 189 (not the species of Lasch!).

On dead culms of *Juncus* and *Carex*.

Phillips mistook the present species for *Peziza melatephra*, Lasch, = *Mollisia melatephra*, Karst., although the latter, as Phillips notes, has spores measuring 12-20  $\times$  2  $\mu$ .

Specimen in Rehm's Ascom., n. 856, examined.

**Mollisia arundinacea.** Phil., Brit. Disc., p. 177; Rehm, Krypt.-Flora, Disc., p. 541; Sacc., Syll., viii. n. 1425.

Gregarious, sessile and fixed by a central point, thin, circular, applanate, with a thin, dark margin, disc plane, pallid or yellowish, then darker and often brownish,  $\frac{2}{3}$ –1.5 mm. across, glabrous; excipulum consisting of hyaline, thin, densely interwoven hyphae, which pass into large, polygonal, olive cells at the cortex, 12–18  $\mu$  diameter; asci narrowly clavate, apex narrowed, 8-spored; spores hyaline, continuous, straight or a very little bent, very narrowly clavate or fusiform, 10–12  $\times$  2–3  $\mu$ ; paraphyses slender, hyaline, about 2  $\mu$  thick, tips usually not at all thickened.

*Xyloma arundinacea*, D.C., Fl. Fr., vol. vi. p. 162.

*Eustegia arundinacea*, Fries, Elench. Fung., ii. p. 112.

On dead stems of *Arundo phragmites*.

Specimens examined in Moug. & Nest., n. 983, and Cooke, Fung. Brit., ed. ii., n. 380.

About  $\frac{1}{4}$  of a line broad; usually seated on a blackish or brownish space. When old the hymenium separates from the excipulum in the manner of an operculum, which led the illustrious Fries to place it in his genus *Eustegia*. (Phillips.)

**Mollisia stramineum.** Phil., Brit. Disc., p. 196.

Crowded or scattered, sessile, hemispherical then expanded, but the margin remaining slightly incurved up to  $\frac{1}{4}$  mm. across; excipulum rather fleshy; minutely parenchymatous; disc pale yellow with more or less of a pink tinge; externally glabrous, but densely covered with minute glistening particles of oxalate of lime; asci narrowly clavate, apex narrowed, 8-spored; spores irregularly biseriate, narrowly fusiform, straight or very slightly curved, smooth, hyaline, for a long time continuous, then 1-septate, 6–8  $\times$  1.5  $\mu$ ; paraphyses slender, very slightly clavate, hyaline.

*Peziza straminum*, B. & Br., Ann. Nat. Hist., n. 571, ser. ii., vol. vii. p. 15.

*Pseudohelotium stramineum*, Sacc., Syll., n. 1247.

On sheaths of wheat and other grasses.

Type specimen examined.

Minute, not exceeding  $\frac{1}{3}$  of a line in diameter; cups

hemispherical, concave, sessile, or at length expanded, margin incurved; externally densely farinaceous, pale; internally of a pinkish-yellow or flesh colour. (B. & Br.)

\*\*\* *On pine leaves and cones.*

**Mollisia incarnata.** Phil., Brit. Disc., p. 191.

Ascophore subsessile, becoming almost plane, disc tinged flesh-colour, pale olive externally, about  $\frac{1}{3}$  mm. diameter; cup-shaped when dry, margin more or less incurved and often irregular, rather fleshy, marginal cells in rows, disc pallid, dark olive externally; asci clavate, spores 8, hyaline, continuous, smooth, elliptical, ends rather acute,  $9-11 \times 3.5-4 \mu$ ; paraphyses rather scanty, filiform, slightly clavate at the apex.

*Peziza incarnata*, Cooke, Grey., v. p. 131.

*Pezizella incarnata* (Cke.), Sacc., Syll., n. 1186.

On pine leaves; Scotland. Scattered or gregarious. The form and size of the spores were incorrectly described by Cooke, and copied by Phillips and Saccardo. Type specimen examined.

**Mollisia pineti.** Phil., Brit. Disc., p. 195.

Gregarious or scattered, sessile, globose, then expanding until nearly plane, contracted when dry; disc whitish or pale grey, externally darker, margin minutely granular or pubescent,  $\frac{1}{2}-1$  mm. across, thin and soft; excipulum parenchymatous, cells small, becoming elongated and very narrow upwards, ending at the margin in parallel, short, slender hyphae; asci cylindric-clavate, apex narrowed, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly cylindric-fusoid, straight or slightly curved,  $14-18 \times 1.5-2 \mu$ ; paraphyses slender, hyaline, tips thickened.

*Peziza pineti*, Batsch, Elench., p. 201, fig. 240.

*Pseudohelotium pineti*, Sacc., Syll., viii. n. 1231.

On dead fallen leaves of Scotch fir.

Specimen in Rehm's Ascom., n. 561B, examined.

Concatenate or solitary cells of various sizes, resembling some minute alga, but coloured, are often present in the tissue of the excipulum or growing up between the paraphyses and asci of this species.

**Mollisia fallax.** Gillet, Champ. Fr. Disc., p. 119; Phil., Brit. Disc., p. 175; Sacc., Syll., viii. n. 1374.

Gregarious or crowded, sessile, at first closed and almost globose, then expanding and becoming plane and discoid, margin more or less incurved when dry, disc grey then brownish, externally blackish-brown, about  $\frac{1}{2}$  mm. across; excipulum formed of interwoven hyphae, running out into brownish pseudoparenchyma at the surface and margin; asci narrowly clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate above, 1-seriate below, hyaline, elliptic-fusiform, or the apex sometimes obtuse, continuous at first, then distinctly 1-septate,  $9-11 \times 3 \mu$ ; paraphyses very slender, tips not thickened, often branched.

*Peziza fallax*, Desm., Ann. Sci. Nat., 1845, p. 367.

On scales of the cones, also on branches of Scotch fir.

Specimen in Desm., Cr. Fr., ser. i., n. 1420, examined.

The spores are distinctly 1-septate at maturity, as stated by Phillips, and I think they will prove to be 3-septate when quite mature; if so, the fungus will go into the genus *Belonidium*.

#### \*\*\*\* On ferns.

**Mollisia filicum.** Phil., Brit. Disc., p. 19.

Ascophore very minute, up to  $\frac{1}{4}$  mm. high and as much across when expanded, at first clavate, then globose and substipitate, finally expanding and more or less funnel-shaped, translucent, very thin, white or with just a tinge of straw-colour, rigid and pallid when dry; excipulum consisting of hyphae about  $3 \mu$  thick and sparsely septate, lying parallel and radiating from root to margin, absolutely glabrous, margin entire; asci narrowly clavate, narrowed into a long, slender base, spores 8, uniseriate, hyaline, smooth, elliptic-oblong, ends rather acute, often 2-3-guttulate,  $9-13 \times 3 \mu$ ; paraphyses filiform, about  $1.5$  thick, apex not thickened.

*Peziza (Mollisia) filicum*, Phil., Grev., xiii. p. 74.

*Pezizella filicum* (Phil.), Sacc., Syll., n. 1166.

On dead stems of *Lastraea filix-mas*.

Gregarious, very minute, almost transparent when moist. Almost cylindrical when quite young, and with a minute

pore at the apex, the disc expanding by degrees. Phillips says the spores become 2-3-pseudoseptate; true septa, however, are not present in the specimens that I have examined from Phillips.

**Mollisia chrysostigma.** Mass.

Gregarious, sessile but attached by a very short, narrowed, stem-like base, pale clear primrose-yellow, sometimes almost white,  $\frac{1}{4}$ – $\frac{1}{2}$  mm. across, almost closed at first, then becoming nearly plane, often with a slight trace of down near the margin when expanding, soon quite glabrous; excipulum parenchymatous, cells irregularly polygonal, running out at the surface and margin into crowded, parallel, obtuse, septate hyphae, yellow at the tip; asci cylindric-clavate, apex rounded, 8-spored; spores obliquely 1-seriate, cylindric-fusiform, hyaline, continuous, smooth, straight or slightly curved,  $8\text{--}11 \times 1.5 \mu$ ; paraphyses very slender, scarcely thickened at the tips.

*Peziza chrysostigma*, Fries, Syst. Myc., ii. p. 128.

*Calloria chrysostigma*, Phil., Brit. Disc., p. 321.

*Pezizella chrysostigma*, Sacc., Syll., viii. n. 1204.

*Peziza* (*Mollisia*) *flaveola*, Cke., Grev., i. p. 131.

*Mollisia flaveola*, Phil., Brit. Disc., p. 192.

*Pezizella flaveola*, Sacc., Syll., viii. n. 1203.

On dead fronds of ferns—*Pteris* and *Aspidium*.

Very minute, soft and membranaceous when moist, more or less contracted when dry.

Cooke's type specimen of *P. flaveola* examined, also specimens in Cooke, Brit. Fung., ed. ii. n. 550; Phil., Elv. Brit., n. 129; and Rehm, Ascom., n. 564.

**Mollisia versicolor.** Phil., Brit. Disc., p. 195.

Ascophores scattered, sessile, very minute, rarely exceeding  $\frac{1}{3}$  mm. across, thin and very delicate, globose, then expanding, glabrous, margin very minutely irregular, white and hyaline, tinged with yellow when dry; excipulum parenchymatous, cells small and polygonal at the base, becoming elongated upwards, and running out into thin hyphae of variable length to form the irregular margin; asci clavate, apex rounded, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly elliptic-fusiform,  $7\text{--}10 \times 1.5 \mu$ ; paraphyses slender, hyaline.

*Peziza versicolor*, Desm., Ann. Sci. Nat., 1853, vol. xx. p. 230.

*Pseudohelotium versicolor*, Sacc., Syll., viii. n. 1234.

On dead fronds of ferns, *Pteris*, *Aspidium*, &c.

Specimen in Desmazières, Crypt. France, ser. ii., n. 15, examined.

The ascophores rarely exceed .5 mm. in width; their substance is very soft; colour pure milk-white, but the least bruising or the prick of a pin causes them to turn yellow. (Desm.)

Phillips says that he has not observed this change of colour in the British specimens; furthermore he gives the spores as  $10-15 \times 3 \mu$ , which is very different to that of Desmazières' species, as given above, hence the question as to whether Phillips was correct in referring his specimens to *P. versicolor*, Desm. Unfortunately I can find no specimens in Phillips' Elv. Brit., n. 164, which is labelled "*Peziza versicolor*, Desm.?"

\*\*\*\*\* *On lichens.*

**Mollisia epithallina.** Phil. & Plow., Brit. Disc., p. 173.

Ascophore sessile or very shortly stipitate, about  $\frac{1}{2}$  mm. across, concave then expanded but with the margin slightly raised, pallid-white or tinged yellow, amber-colour when dry, glabrous, epithecium thin, parenchymatous, cells polygonal, more or less elongated radially, margin entire; asci narrowly clavate, base slender, spores 8, irregularly biseriate, hyaline, smooth, narrowly elliptical, ends rather acute,  $8-9 \times 2.5 \mu$ , often 2-4-guttulate; paraphyses cylindrical or very slightly thickened upwards,  $1.5 \mu$  thick.

*Peziza miliaris*, Wallr., Phil. & Plow., Grev., iv. p. 121.

*Peziza (Mollisia) epithallina*, Phil. & Plow., Grev., vi. p. 24.

*Pezizella epithallina* (P. & P.), Sacc., Syll., n. 1167.

On upper surface of *Peltigera canina*.

Scattered or gregarious. Some of the ascophores are shortly but distinctly stipitate. Specimen in Herb. Kew from Plowright examined.



Saccardo places *Peziza miliaris*, Wallr. (Flor. Cr., n. 2605), in the genus *Pseudohelotium*, Fckl., as the outside of the excipulum is described as minutely pruinose, and when *M. epithallina* was first recorded in Grevillea (vol. iv. p. 121), under the name of *Peziza miliaris*, by Phillips and Plowright, it was described as "externally minutely pruinose." Afterwards the same authors (Grev., vi. p. 24), say, the specimen referred to *P. miliaris*, Wallr., "turns out to be a distinct thing, and belongs to the section *Mollisia*. We distinguish it as *Peziza (Mollisia) epithallina*, n.s." In the diagnosis given no mention is made of the pruinose exterior, and it certainly does not exist in the specimens I examined. The authors in the first instance determined the fungus to be *P. miliaris*, Wallr., and consequently reproduced the author's description word for word as far as it went, a highly reprehensible practice, and only justifiable when there is no opportunity of examining specimens.

\*\*\*\*\* On dung.

**Mollisia albula.** Phil., Brit. Disc., p. 192.

Ascophore about  $\frac{1}{3}$  mm. across, sessile, concave, then plane or slightly convex, soft and rather fleshy; every part glabrous, shining, whitish; excipulum consisting of slender, septate hyphae, arranged parallel and radiating from base to margin; asci narrowly clavate, spores 8, irregularly biseriate, hyaline, smooth, fusiform or subcylindrical,  $6-10 \times 2$ ; paraphyses filiform, slightly clavate.

*Pezizella albula* (Phil.), Sacc., Syll., n. 1169.

On rabbit dung.

Under a two in. power the cups look like grains of sand. (Phil.)

Authentic specimen from author examined.

*Doubtful species.*

**Mollisia jugosa.** Phil. & Plow., Grev., xiii. p. 74; Brit. Disc., p. 184.

Crowded, globose, sessile, vertically rugose, scabrous, black, mouth contracted; disc cinerous; asci clavate;



spores 8, oblong-elliptic or fusiform, 3-5-guttulate, becoming 3-5-pseudoseptate,  $14-18 \times 3-5 \mu$ ; paraphyses numerous, adherent.

*Pyrenopeziza jugosa*, Sacc., Syll., viii. n. 1466.

On dead herbaceous stems.

Cups  $100 \mu$  broad. This is in external characters like *P. atrata*. (Phillips.)

If the spores are multiseptate, the species cannot be a *Mollisia*, and the characters are rather brief. It cannot be properly placed by Saccardo, as his genus *Pyrenopeziza* has continuous spores.

Unknown to me.

***Mollisia micrometra*.** Phil., Brit. Disc., p. 184.

Ascophore very minute, subturbinate, brownish, mouth somewhat contracted, finely striate, attached by strong villous hairs; asci clavate; spores 8, filiform.

*Peziza micrometra*, B. & Br., Ann. Nat. Hist., n. 773.

*Gorgoniceps micrometra*, Sacc., Syll., viii. n. 2089.

On dead stems of *Juncus*.

Extremely minute, punctiform, horn-brown; disc plane. (B. & Br.).

Ascophore not more than  $100 \mu$  broad. The spores refuse to quit the asci in the specimen examined, hence the measurement cannot be safely given. (Phil.)

Not examined. There are no ascophores present on what was the type specimen in Herb. Kew.

## MOLLISIELLA. Mass.

Sessile, subglobose and closed at first, then expanding; excipulum parenchymatous, the cortical cells largest; externally, especially near the margin, minutely hoary, due to the presence of very slender, hyaline hairs; asci subcylindrical, 8-spored; spores globose or subglobose, continuous, hyaline, 1-seriate.

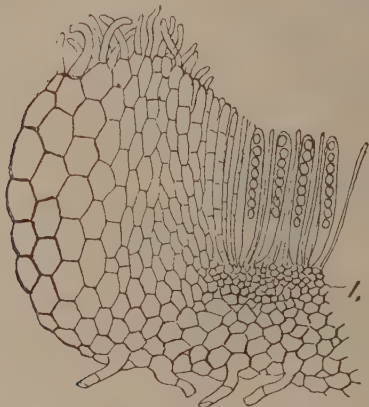
*Mollisiella*, Phil., Brit. Disc., p. 193 (as a subgenus of *Mollisia*); *Pseudohelotium*, sect. B. *Mollisiella*, Sacc., Syll., viii. p. 304.

Characterised by the excipulum being minutely hoary or

furfuraceous, and the globose spores; in other respects as in *Mollisia*.

***Mollisiella ilicincola*. Mass.**

Caespitose or less frequently scattered, subglobose and closed at first, then expanding, often irregular when clustered, about 1 mm. across; excipulum parenchymatous, the cells becoming large, 8–12  $\mu$  diameter, thicker walled, and brown towards the periphery; externally, especially at the somewhat incurved margin, whitish and minutely hoary, due to the presence of numerous hyaline, continuous



*Mollisiella ilicincola*, Mass.; vertical section through portion of an ascophore,  $\times 400$ .

hyphae, slightly tapering to the hooked tip, 15–30  $\times$  3  $\mu$ ; asci cylindric, apex rounded, base narrowed, 8-spored, very numerous; spores globose, hyaline, smooth, continuous, usually 1-guttulate, 4–5  $\mu$ ; paraphyses slender, somewhat clavate.

*Peziza ilicincola*, Ann. Nat. Hist., n. 958, t. xvi. fig. 17 (1861).

*Mollisia* (*Mollisiella*) *ilicincola*, Phil., Brit. Disc., p. 193.

*Pseudohelotium* (*Mollisiella*) *ilicinolum*, Sacc., Syll., viii. n. 1267.

On branches of holly, more especially on *Myriangium*, that grows on holly bark.

Type specimen examined.

**Mollisiella hydnicola.** Mass.

Ascophore orbicular, irregular, then plane, dark green: asci cylindrical, 8-spored; spores 1-seriate, globose or subglobose,  $10 \times 7.5 \mu$ , or  $10 \mu$  diameter, smooth; paraphyses slender, branched.

*Peziza* (*Mollisia*) *hydnicola*, B. & Br., Ann. Nat. Hist., n. 1327, p. 18, pl. xx., fig. 20 (1870).

*Mollisia* (*Mollisiella*) *hydnicola*, Phil., Brit. Disc., p. 194.

*Pseudochelotium* (*Mollisiella*) *hydnicolum*, Sacc., Syll., viii. n. 1269.

On *Hydnum ochraceum*.

Conidia cylindric-oblong,  $2.5-3.5$  long.

The above is all the information that can be derived from the original diagnosis and figure. No specimen exists in Berkeley's herbarium.

BELONIDIUM. Mont. & Dur. (emended.) (figs. 30-33, p. 156.)

Sessile, base sometimes narrowed, superficial, minute; excipulum parenchymatous; glabrous; asci cylindric-clavate, apex usually narrowed, 8-spored; spores 2-seriate, elongated, narrowly elliptical or fusiform, smooth, hyaline, 3-many-septate; paraphyses present.

*Belonidium*, Mont. & Dur., Fl. Algiers, t. 28, f. 8; Phil., Brit. Disc., p. 148; Sacc., Syll., viii. p. 496 (in part).

The most marked character of the present genus is the 3-many-septate spores; in other respects it is closely allied to *Mollisia* and *Pseudopeziza*.

\* *On Dicotyledons.*

**Belonidium ventosum.** Phil., Brit. Disc., p. 151.

Gregarious, sessile, subglobose then becoming plane or slightly convex, margin thickish, slightly raised, often more or less wavy; entirely grey or the hymenium pale

ochraceous, usually becoming blackish with age or when dry; 1-2 mm. across; excipulum composed of interwoven, hyaline, thin hyphae, which pass into a parenchymatous cortex of brownish-olive, polygonal cells 8-12  $\mu$  diameter; externally and the margin smooth; asci narrowly cylindric-clavate, apex slightly narrowed, tapering below into a long, slender pedicel, 8-spored; spores obliquely 1-seriate, or 2-seriate near the apex, hyaline, smooth, 3-5-guttulate, then delicately 3-septate, narrowly elliptical, ends rather acute, 15-18  $\times$  3-3.5  $\mu$ ; paraphyses cylindrical, tips not thickened, septate, about 2  $\mu$  thick.

*Peziza ventosa*, Karsten, Mon. Pez., p. 157.

*Mollisia ventosa*, Myc. Fenn., i. p. 188; Sacc., Syll., viii. n. 1454.

On damp, rotten wood.

Specimen examined in Karsten's Fung. Fenn., n. 733.

**Belonidium minutissimum.** Phil., Brit. Disc., p. 149; Sacc., Syll., viii. n. 2080.

Ascophores obovate and closed at first, then expanding until saucer-shaped or almost plane, glabrous, whitish, pale amber and with a translucent appearance when dry, up to  $\frac{3}{8}$  mm. across; excipulum minutely parenchymatous, cells narrow and elongated from base to margin; asci large, clavate, apex slightly narrowed, base attenuated into a long, slender pedicel, 8-spored; spores irregularly 2-seriate, hyaline, straight or slightly curved, cylindric-fusoid, 5-7-septate, 28-30  $\times$  5-6  $\mu$ ; paraphyses hyaline, very slender, sometimes forked, tips not thickened.

*Peziza minutissima*, Batsch, fig. 143.

*Peziza helminthosporii*, Blox., ms. in the Hb. Berk.

On wood and twigs, always nestling among the mycelium of some species of *Helminthosporium*. Gregarious, sometimes confluent.

Bloxam's specimen examined.

**Belonidium agaricinum.** Mass.

Ascophores stipitate, gregarious, fleshy, rigid when dry, concave at first, then plane, finally convex, rather wavy, glabrous, dark verdigris-green, 2-4 mm. across; excipulum composed of densely interwoven hyphae about 4  $\mu$  thick; asci elongated, narrowly clavate, attenuated into a long,

tapering pedicel, 8-spored; spores irregularly 2-seriate, hyaline, narrowly cylindric-fusiform, straight or slightly curved, at first 1-septate, finally becoming 7-septate,  $28-30 \times 4-5 \mu$ ; paraphyses slender, often forked, tips not thickened, very numerous; stem very short, stout, more or less narrowed towards the base.

*Peziza agaricina*, Carm., in Engl. Flor., vol. v. p. 207.

*Helotium agaricinum*, Phil., Brit. Disc., p. 170; Sacc., Syll., n. 896.

On rotten wood.

Carmichael's specimen, now in Herb. Berk., Kew, examined.

Resembling the genus *Chlorosplenium* in the green colour of the ascophore, but differing in the multiseptate spores.

### **Belonidium cyanites. Mass.**

Gregarious; hemispherical then expanded and with a slightly upraised margin, about  $\frac{1}{3}$  mm. across, sessile on a broad base, pale amber and rather translucent when moist, externally black and disc greyish when dry; excipulum parenchymatous, cells irregularly polygonal,  $6-8 \mu$  diameter, becoming arranged in parallel series towards the margin and giving it a minutely fimbriated appearance; asci clavate, apex slightly narrow, 8-spored; spores irregularly biseriate, narrowly cylindric-fusiform, hyaline, guttulate then 3-septate, straight or very slightly curved,  $22-25 \times 3 \mu$ ; paraphyses very numerous, slender, about  $2 \mu$  thick, apex capitate,  $4 \mu$  thick.

*Mollisia cyanites*, Cke. & Phil., Brit. Disc., p. 176; Sacc., Syll., viii. n. 1452.

On some herbaceous stem.

Described from Klotzsch's specimen in Herb. Kew; the same specimen from which the imperfect description in Brit. Disc. was drawn up. The fungus when growing, I should imagine would be pale coloured.

### **Belonidium Arctii. Mass.**

Sessile, innate, gregarious, subglobose and closed at first, then expanding and becoming almost plane, the pale, irregular margin remaining erect or slightly incurved; disc pale watery brown when moist, externally dark brown, minutely granular;  $\frac{1}{2}-\frac{3}{4}$  mm. across; excipulum truly

parenchymatous, cortical cells polygonal, 9–11  $\mu$  diameter, brown, passing into parallel, septate, pale hairs of various lengths to form the irregular margin; asci clavate, apex narrowed, 8-spored; spores irregularly 2-seriate, narrowly linear-lanceolate, hyaline, smooth, 2–3 septate, 35–40  $\times$  5  $\mu$ ; paraphyses 3–4  $\mu$  thick, hyaline, scarcely thickened at the summit.

*Peziza Arctii*, Phil., in Bucknall's Fungi of Bristol, n. 999, fig. 5.

*Mollisia Arctii*, Phil., Brit. Disc., p. 183.

*Belonium Arctii*, Sacc., Syll., n. 2044.

On dead stems of *Arctium lappa*.

Authentic specimen from Phillips examined; also Vize, Micro. Fung. Brit., n. 476 (called *Peziza Arctii*, B. & Br.).

### ***Belonidium pruinsum*. Mass.**

Ascophores gregarious, sessile on a broad base, often surrounded by more or less evident white hyphae, plane from the first, circular and discoid when isolated, often confluent and forming irregular patches,  $\frac{1}{2}$ – $\frac{3}{4}$  mm. across, chalky white at first, the disc finally becoming densely mealy or pruinose under a lens; hypothecium parenchymatous, cells minute; asci clavate, narrowed below into a long, slender, usually crooked pedicel, 8-spored; spores irregularly 2-seriate, hyaline, narrowly elliptical, ends narrowed, often curved, continuous for some time, finally 2–3 septate, 21–25  $\times$  4–5  $\mu$ ; paraphyses hyaline, very slender, often irregularly branched, tips not thickened.

*Helotium pruinsum*, Jerdon, Ann. Nat. Hist., ser. iii., vol. xviii. p. 13, pl. 5, fig. 33 (1866); Phil., Brit. Disc., p. 165.

On *Hypoxylon fuscum* and *Diatrype stigma*, also on dead wood and bark.

Jerdon's type in Herb. Kew, examined.

Readily distinguished by the pruinose disc, and the large, septate spores.

### **\*\* On Monocotyledons.**

#### ***Belonidium filisporum*. Phil., Brit. Disc., p. 152.**

Scattered or subgregarious, sessile, innate, rather fleshy,

soft, at first subglobose and closed, then plane and usually slightly marginate; disc whitish, externally horn-colour or tawny, smooth, margin paler, especially when dry;  $\frac{1}{2}$ –1 mm. across; excipulum of interwoven hyphae running out into clavate, septate, brownish parallel ends, the terminal cells forming a parenchymatous cortex of circular or polygonal cells which become smaller upwards, and run out at the margin into parallel, septate, pale hyphae; asci cylindric-clavate, apex narrowed, base rather stout, 8-spored; spores irregularly 2-seriate, narrowly cylindrical, apex blunt, base acute, hyaline, smooth, 3-septate, rarely 5-septate, straight or very slightly curved,  $28\text{--}33 \times 3\text{--}4 \mu$ ; paraphyses  $3\text{--}4 \mu$  thick, hyaline, almost cylindrical.

*Peziza (Mollisia) filispora*, Cooke, Grev., iii. p. 66.

*Belonium filisporum*, Sacc., Syll., viii. n. 2039.

On sheaths of various grasses.

Type specimen examined.

**Belonidium lacustre.** Phil., Brit. Disc., p. 149.

Ascophore sessile, attached by a central point, closed at first, then expanding and becoming quite plane, but the margin slightly raised and narrowly incurved when dry; orbicular, rather soft and watery, disc plane or even slightly convex, dingy olive, yellowish-brown when dry, externally blackish brown, smooth,  $\frac{2}{3}$ –1½ mm. across; cortical cells polygonal, brown,  $10\text{--}12 \mu$  diameter, passing into parallel, septate, paler hyphae at the margin; asci clavate, 8-spored; spores 2-seriate, elliptic-oblong, hyaline, smooth, 1–3-septate,  $21\text{--}25 \times 6\text{--}7 \mu$ ; paraphyses cylindrical, about  $3 \mu$  thick.

*Peziza lacustris*, Fries, Syst. Myc., ii. p. 143.

*Niptera lacustris*, Sacc., Syll., viii. n. 2085.

*Peziza scirpi*, Rab., Herb. Myc., n. 730; Elv. Brit., n. 183.

On dead stems of *Scirpus*, *Juncus*, *Arundo*, &c.

Specimen in Fries', Scler. Suec., n. 173 examined; Cooke, Fung. Brit., ed. ii., n. 655; Phil., Elv. Brit., n. 183; Desm., Cr. Fr., ser. i., 1064, are also identical.

Spores for a long time continuous, then 1-septate, rarely reaching the 3-septate stage. The excipulum is formed of slender, interwoven hyphae that become clavate, septate, and brown, and are arranged parallel at the periphery, the external cells forming the parenchymatous cortex.



Closely allied to *B. pullum*, but known by the elliptical spores with obtuse ends.

***Belonidium vexatum*.** De Notaris, Prof. Disc., p. 380; Sacc., Syll., viii., n. 2079.

Ascophore stipitate, cup-shaped then expanding, when dry the mouth is contracted and externally more or less distinctly wrinkled, pallid or with a pink tint, stem short, stout, sometimes almost absent, about 1 mm. high and broad; excipulum composed of hyaline, slender, intricately interwoven hyphae, becoming parallel towards the surface, and running out into slender, free hyphae of various lengths to form the irregular margin; asci large, cylindric-clavate, apex slightly narrowed, pedicel short, stout, 8-spored; spores irregularly 2-seriate, cylindric-oblong, ends rather obtuse, 3-septate, hyaline, straight or slightly curved,  $28-35 \times 4 \mu$ ; paraphyses simple or sometimes forked from near the base, slender, hyaline, tips slightly thickened.

*Belonidium culmicolum*, Phil., Brit. Disc., p. 148, pl. 5, fig. 29.

On dead leaves of various grasses.

Specimen from Rab., Fung. Eur., n. 519, examined.

***Belonidium pullum*.** Phil. & Keith, Grev., vi. p. 75, pl. 97, figs. 8-10 (fig. 11 is inaccurate); Phil., Brit. Disc., p. 151. (figs. 30-33, p. 156.)

Sessile attached by a narrow point, at first almost closed, soon expanding but the margin remaining slightly raised and incurved; disc watery grey or brownish, externally smooth, brown,  $\frac{2}{3}-1\frac{1}{2}$  mm. across; excipulum formed of interwoven, thin hyphae that pass into clavate, septate, brown tips, the external cells forming a parenchymatous cortex of brown cells  $8-10 \mu$  diameter, and running out at the margin into parallel, septate, paler hyphae; asci cylindric-clavate, apex narrowed, 8-spored, spores narrowly fusiform, ends rather acute, becoming 3-septate, hyaline, smooth, irregularly 2-seriate,  $25-30 \times 5 \mu$ ; paraphyses slender,  $2 \mu$  thick, cylindrical.

*Belonium pullum*, Sacc., Syll., viii. n. 2041.

On sheaths and leaves of *Poa*, *Typha*, and *Phragmites*.

Authentic specimen from Phillips examined.

Almost indistinguishable under a lens from *B. lacustre*.

especially when dry, but distinct in the narrow asci, and the longer and narrower, pointed spores.

**Belonidium excelsius.** Phil., Brit. Disc., p. 150.

Ascophore, sessile, closed at first, then expanding, almost plane or slightly concave, thin, disc whitish or pallid, externally pale grey or pallid, smooth, concave when dry; about  $\frac{1}{3}$ – $\frac{2}{3}$  mm. across, gregarious; cortex parenchymatous, cells polygonal or almost circular, 10–12  $\mu$  across, becoming elongated and parallel at the margin; asci narrowly cylindric-clavate, apex narrowed, produced at the base into a long, slender pedicel, 8-spored; spores irregularly 2-seriate, narrowly cylindric-fusiform, straight or slightly curved, multi-guttulate, then 3-septate, finally 5-many-septate, hyaline, smooth,  $55\text{--}65 \times 4\text{--}5 \mu$ ; paraphyses about 2  $\mu$  thick, tip very slightly thickened, sometimes branched.

*Peziza excelsior*, Karst., Mon. Pez., p. 165.

*Mollisia excelsior*, Karst., Myc. Fenn., p. 199; Sacc., Syll., 1459.

On dead culms of *Arundo*, &c.

Specimen in Karstens' Fung. Fenn., n. 644, examined.

\*\*\* *On Gymnosperms.*

**Belonidium Jerdoni.** Mass.

Scattered or gregarious, sessile, turbinate then expanded, disc pale rufous or dingy honey-colour, externally brownish, the erect, irregular margin whitish, thin, about  $\frac{1}{2}$  mm. across; hypothecium delicately parenchymatous, basal cells polygonal, becoming long and narrow upwards, and ending at the margin in thin, slender hyphae of irregular lengths; asci clavate, apex narrowed, pedicel slender, often crooked, 8-spored; spores arranged in an irregular fascicle, narrowly linear, apex slightly thickened, guttulate then 3-septate,  $24\text{--}28 \times 2 \mu$ , tinged greenish in the mass, slightly bent; paraphyses septate, slender, hyaline.

*Mollisia lurida*, Phil., Brit. Disc., p. 197.

*Peziza Jerdoni*, Cke. & Phil., MS. in Herb. Kew.

Phillips considered the present species to be the same as *Peziza lurida*, Pers., Syn. Fung., p. 666, because there is a specimen at Kew called *Peziza lurida* by Fries; but this

proves nothing at all, and it is well known that Fries' knowledge of microscopic fungi went only as far as a pocket-lens could aid him, besides Persoon distinctly states that his fungus is identical with *Peziza pineti* of Batsch.

On dead leaves of *Pinus sylvestris*.

Jerdon's specimen in Herb. Kew, examined.

### POCILLUM. De Not.

Ascophore obconic or turbinate, minute, apex truncate, immarginate; hypothecium minutely parenchymatous, excipulum composed of parallel, septate hyphae; asci 8-spored; spores arranged in a parallel fascicle, slender, elongated, hyaline, continuous (in British species); paraphyses slender.

*Pocillum*, De Notaris, Prof. Disc., p. 361; Sacc., Syll., viii. p. 605.

A natural genus, characterised by the minute, vertical, clavate or narrowly obconic ascophore, and the long, slender spores. Saccardo has placed the present genus in the *Dermateae*, but I fail to see on what grounds; the excipulum is glabrous, soft, and in some species even watery when fresh; the excipulum is formed of septate hyphae arranged in a parallel series running from base to margin.

**Pocillum Cesatii.** De Not., Prof. Disc., p. 361; Sacc., Syll., viii. n. 2501.

Ascophores gregarious, hypophyllous, erumpent, minute, subsessile, vertical, narrowly clavate or obconic, truncate, immarginate; disc pallid, outside smoky-olive, about  $\frac{1}{3}$  mm. across, up to  $\frac{1}{2}$  mm. high; hypothecium parenchymatous, hyaline, cells minute, excipulum formed of septate hyphae, arranged in a parallel series, smoky-olive; asci elongated, narrowly cylindrical, apex thickened, 8-spored; spores hyaline, continuous, arranged in a parallel fascicle, nearly as long as the ascus,  $130-140 \times 1-1.5 \mu$ ; paraphyses slender, cylindrical, tip slightly clavate, often with an olive tinge.

*Helotium Cesatii*, Mont., Syll., Crypt., p. 187.

On the under surface of dead oak leaves.

Specimen in Saccardo's Myc. Ven., n. 952, examined. The

present species has only once been collected in Britain—Epping Forest—so far as I am aware.

**Pocillum Boltoni.** Phil., Grev., vol. xvi. p. 94; Sacc., Syll., viii. n. 2502.

Minute, scattered, at first cylindrical, then becoming nearly turbinate-truncate, glabrous, shining, horn-coloured, soft, watery, much contracted when dry; hymenium plane or a little depressed; asci broadly clavate; spores 8, elongated, subcylindrical, obtuse at the ends,  $40-50 \times 3-4 \mu$ ; paraphyses filiform, thickened at the apices.

On dead *Equisetum*, lying in water.

Ascophore  $100-200 \mu$  broad,  $300-400 \mu$  high. The spores, which are large for the size of the plant, are straight or a little bent, colourless, and furnished with several large vacuoles. They have a propensity to throw out long germ-tubes while yet in the ascus. The excipulum is composed of elongated septate threads, but showing no colour, as in the other species of the genus. (Phillips.)

Unknown to me.

## STAMNARIA. Fuckel. (figs. 15-17, p. 156).

Gregarious, minute, erumpent, shortly stipitate, closed at first then expanding, but the opening remaining contracted and surrounded by a delicate, minutely fimbriate, scarious margin; horny, glabrous, rigid when dry; asci clavate, apex narrowed and with the wall thickened, 8-spored; spores elongated, hyaline, continuous, 2-seriate; paraphyses septate.

*Stamnaria*, Fekl., Symb. Myc., p. 309; Phillips, Brit. Disc., p. 321; Rehm, Krypt.-Flora Disc., p. 465; Sacc., Syll., viii. p. 620.

*Peziza*, of old authors.

Distinguished by the horny, perfectly glabrous ascophore with a somewhat narrowed, delicately bordered mouth.

**Stamnaria equiseti.** Sacc., Syll., viii. n. 2559; Rehm, Krypt.-Flora Disc., p. 466, figs. 1-7, p. 449. (figs. 15-17, p. 156.)

Ascophore erumpent, subglobose, closed and sessile at first, then furnished with a short slender stem, glabrous, horny, mouth somewhat contracted and bordered by a delicate, pale, dry, minutely fimbriate margin formed of thin, parallel hyphae;  $\frac{1}{2}$ –1 mm. high and broad; asci clavate, apex narrowed, 8-spored; spores narrowly elliptical, ends obtuse, usually slightly curved, hyaline, smooth, continuous, often 1-guttulate,  $16\text{--}21 \times 5\text{--}7 \mu$ , 2-seriate; paraphyses septate, slightly clavate at the tips.

*Lycoperdon equiseti*, Hoffm., Veg. Crypt., ii. p. 17, tab. v. fig. 1 (1790).

*Peziza Persoonii*, Mong., in Pers., Myc. Eur., i. p. 288, tab. 12, fig. 1 (1822).

*Stammaria Persoonii*, Fekl., Symb. Myc., p. 309; Phil., Brit. Disc., p. 321.

On decaying stems of various species of *Equisetum*.

Specimen from Persoon examined, also specimens in Rehm, Ascom., n. 615, and Rab., Fung. Eur., n. 123.

Sometimes the ascophore remains quite sessile, and in some instances the spores remain 1-seriate.

### HELOTIUM. Fries (emended). (figs. 26–29, p. 156.)

Ascophore sessile and narrowed to a very short stem-like base, or distinctly stipitate, the stem not usually longer than the breadth of the disc; minute, rarely more than 3 mm. across, usually much less; closed at first, then gradually expanding until plane, or even slightly convex, glabrous, margin entire; cortex parenchymatous, hypothecium hyaline; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores hyaline, smooth, elongated, continuous or 1-septate, 2-seriate; paraphyses present. Growing on plants.

*Helotium*, Fries, Summa Veg. Scand., p. 356; Phil., Brit. Disc., p. 152; Sacc., Syll., viii. p. 210 (all in part).

*Hymenoscypha*, Phil., Brit. Disc., p. 111 (in part).

Species belonging to various other genera are also included, as will be seen by the synonymy.

The leading features of the genus, as here understood, are—ascophore minute, glabrous, margin entire; sessile or

shortly stipitate, spores 2-seriate; growing on plants. *Cyathicula* differs in the toothed margin of the ascophore; *Ciboria* differs in the ascophore being larger, stem elongated, hypothecium brown. *Mollisia* is distinguished by the soft and fleshy consistency of the ascophore, larger cortical cells, and in being truly sessile on a broad base.

In the following attempt to group the species into sections, it must be remembered that the characters selected are not absolute, *i.e.*, although species are, as a rule, most abundant on a particular host, it does not follow that they may not occur on a different one.

A. *Growing on wood, bark, or branches.*

\* *Ascophore sessile or snb sessile.*

**Helotium claro-flavum.** Berk., Outl., p. 372; Phil., Brit. Disc., p. 165, pl. 5, fig. 31; Sacc., Syll., viii. n. 914.

Gregarious or sometimes crowded, sessile and attached by a central point, or rarely very shortly stipitate, globose and closed when young, gradually expanding until plane, the margin remaining slightly raised, and sometimes wavy; firm, glabrous, clear yellow, disc darkest, up to 1 mm. across; cortical cells elongated and very narrow, running parallel from base to margin; asci narrowly clavate, apex narrowed, pedicel slender, 8-spored; spores 1-seriate or with a tendency to become 2-seriate upwards, hyaline, continuous, straight, sometimes 2-guttulate, elliptical, ends obtuse,  $7-10 \times 2.5-3 \mu$ ; paraphyses hyaline, slender, slightly thickened at the tip.

*Peziza claroflava*, Grev., Flor. Ed., p. 424.

On decayed wood and branches.

Specimen named by Greville, and now in the Kew herbarium, examined.

Closely allied to *H. imberbe*, differing in the bright yellow colour of the ascophore. *H. lenticulare* is also allied, but has larger spores.

**Helotium lechithinum.** Mass. (figs. 10-13, p. 290.)

Gregarious, sessile, hemispherical, then quite plane or even slightly convex with a very slightly raised, crisped margin,

up to 4 mm. across; entirely clear egg-yellow, glabrous; excipulum consisting of densely packed parallel, septate hyphae that become clavate towards the exterior, 8-10  $\mu$  thick at the apex, hyaline; numerous slender, hyaline, septate, branched hyphae spring from the lower part of the excipulum and fix the fungus to the matrix; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, elliptical, ends obtuse, hyaline, continuous,  $21-23 \times 11-12 \mu$ ; paraphyses slender, septate, apex clavate, 4-5  $\mu$  thick, filled with orange granules.

*Peziza lechithina*, Cke., Grev., iv. p. 110; Cke., Mycogr., fig. 89; Phil., Brit., Disc., p. 96.

*Humaria lechithina*. Sacc., Syll., n. 843.

On old trunks.

Type specimen examined.

The cups were grouped on a spot five or six inches in length and two or three inches broad, on a decorticated trunk saturated with water. (Cooke.)

*Helotium scoparium*. Cooke, Grev., vi. p. 111; Phil., Brit. Disc., p. 168; Sacc., Syll., viii. n. 974.

Scattered or gregarious, sessile, fleshy, globose at first, then expanding until nearly or quite plane, glabrous, pallid, about 1 mm. across; excipulum parenchymatous, hyaline, cells irregularly polygonal,  $6-9 \times 6 \mu$ ; asci cylindric-clavate, pedicel short, stout, 8-spored; spores irregularly 2-seriate, hyaline, continuous, cylindric-fusoid, ends obtuse, usually slightly curved,  $22-25 \times 5 \mu$ ; paraphyses hyaline, slender, becoming slightly clavate upwards.

On dead twigs of broom.

Type specimen examined.

The plants have a peculiar silvery grey stem when dry. Cooke says the spores are "binucleate, at length with the endochrome divided." I have observed some of the spores 2-guttulate, but there is no evidence of a true septum.

*Helotium badium*. Phil., Brit. Disc., p. 167; Sacc., Syll., viii. n. 1013.

Gregarious, sessile and attached by a central point, at first clavate or piriform and closed, then becoming concave, and finally plane or slightly convex and discoid, rather fleshy,



glabrous, bay-brown (when dry),  $1\frac{1}{2}$ –2 mm. across; excipulum formed of hyaline, densely interwoven hyphae about  $4\ \mu$  thick; asci clavate, apex slightly narrowed, pedicel short, 8-spored; spores irregularly 2-seriate, hyaline, continuous, elliptic-fusiform, ends acute, often slightly curved,  $25\text{--}30 \times 5\text{--}6\ \mu$ ; paraphyses slender, septate, sometimes forked, slightly thickened at the tips, which are sometimes brown.

On dead twigs (willow?).

Type specimen examined.

When the twigs are covered with bark, the fungus is erumpent, bursting through the bark. Closely resembling *H. terrigenum* in the size and form of spores, asci, and paraphyses, differing in colour, the sessile ascophore, and in the structure of the excipulum.

**Helotium imberbe.** Fries, Summa Veg. Scand., p. 356; Phil., Brit. Disc., p. 164; Sacc., Syll., viii. n. 878.

Gregarious, stem very short or absent, subglobose and closed when young, becoming nearly plane, margin entire, sometimes wavy, incurved when dry, firm,  $\frac{1}{2}$ –1 mm. across, glabrous, entirely white, pallid or with an amber tinge when dry; cortex consisting of elongated, very narrow cells, running parallel from base to margin; asci narrowly clavate, apex slightly narrowed, pedicel slender, 8-spored; spores obliquely 2-seriate, hyaline, continuous, linear-elliptic, often slightly curved,  $8\text{--}13 \times 1\cdot5\text{--}2\ \mu$ ; paraphyses slender, hyaline, apex slightly thickened.

*Peziza imberbis*, Bull., Champ. Fr., t. 467, f. 2.

On wood of willow and alder.

Specimen determined by Berkeley examined, also Fuckel, Fung. Rhen., n. 1148.

Resembling *H. lenticulare* in habit, but distinguished by the totally white colour of the ascophore and the smaller spores.

**Helotium laburni.** B. & Br., Ann. Nat. Hist., n. 1624, ser. iv., vol. xvii. p. 143 (1876).

Gregarious, sessile or shortly stipitate, closed at first, then concave, finally plane, contracted when dry, margin usually minutely incurved; disc whitish, clear ochraceous, or yellow, externally pale, minutely furfuraceous, up to 1 mm. across,

about same in height; hypothecium and excipulum formed of hyaline, interwoven hyphae; these are parallel in the cortical portion, and run out into parallel, slender, short hyphae at the margin; asci cylindrical, apex obtuse, pedicel narrowed, 8-spored; spores irregularly 2-seriate, or sometimes almost obliquely 1-seriate, hyaline, continuous, smooth, 3-4-guttulate, fusiform, ends acute, or the apex sometimes obtuse,  $18-22 \times 6-7 \mu$ ; paraphyses numerous, about  $2 \mu$  thick, hyaline, tips only slightly thickened.

*Hymenoscypha laburni*, Phil., Brit. Disc., p. 135.

On decorticated branches of laburnum.

Type specimen examined.

*H. salicellum* is allied to the present species, but differs in the orbicular, plane, adpressed ascophore, margin not furnished with parallel hyphae, and the spores becoming septate.

**Helotium ferrugineum.** Fr., Summa Veg. Scand., p. 356; Phil., Brit. Disc., p. 154; pl. 5, fig. 30; Sacc., Syll., viii. n. 949.

Gregarious or scattered, narrowed below into a more or less distinct stem-like base; at first piriform and closed then expanding until saucer-shaped, glabrous, about 1 line broad; disc brownish or yellowish rust-colour, externally pale; cortex composed of very narrow, parallel hyphae radiating from base to margin; asci cylindric-clavate, apex narrowed, pedicel long and slender, 8-spored; spores irregularly 2-seriate upwards, hyaline, smooth, continuous, elliptical, ends rather acute, or the apex sometimes obtuse,  $10-13 \times 3-3.5 \mu$ ; paraphyses slender, hyaline, slightly thickened upwards.

*Peziza ferruginea*, Schum., Saell., p. 412.

On dead twigs of oak, &c.

Specimen in Herb. Berk., accepted as typical.

Cups gregarious or scattered, about  $\frac{1}{4}$  to  $\frac{1}{2}$  a line broad; at first concave then plane, at length convex; flesh tinted brown; margin lighter in colour than the disc, which is ferruginous; sporidia very variable in size and shape. (Phil.)

**Helotium lenticulare.** Fries, Summa Veg. Scand., p. 356; Phil., Brit. Disc., p. 157; Sacc., Syll., viii. n. 916.

Gregarious or sometimes several individuals become confluent, sessile or narrowed into a short, stem-like base, which

is often blackish, remainder bright yellow, concave then convex, adpressed to the wood, glabrous, 1-2 mm. across; hypothecium and excipulum formed of interwoven hyphae, these run as parallel septate hyphae, radiating from base to margin to form the cortex; asci elongated, narrowly clavate, pedicel long and slender, 8-spored; spores obliquely 1-seriate, hyaline, continuous,  $10-15 \times 4-5 \mu$ ; paraphyses hyaline, cylindrical, about  $2 \mu$  thick.

*Peziza lenticularis*, Ball., Champ. Fr., t. 300, figs. A, c.

On rotten trunks and branches, especially beech.

Specimen in Fung. Rhen., n. 1151, examined.

**Helotium ochraceum**, Berk., Outl., p. 372; Phil., Brit. Disc., p. 169; Sacc., Syll., viii. n. 937.

Ascophores gregarious, piriform and closed at first, gradually expanding until quite plane, attached by a very short stem-like base, yellowish brown, glabrous, but the disc covered with minute, glistening particles; about  $\frac{1}{2}$  mm. across, rather fleshy, firm, cortical cells polygonal at the base, becoming long and narrow towards the margin; asci clavate, tapering gradually from apex to base, often curved, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly elliptical, ends rather obtuse, straight or slightly bent,  $24-26 \times 5 \mu$ ; paraphyses hyaline, very slender, often irregularly branched.

*Peziza ochracea*, Grev., Scot. Crypt. Flora, pl. 5.

On bark.

Distinguished from allied species by the asci tapering very gradually from apex to base, and by the disc being covered with minute, glistening granules. The type specimen is lost, and I have accepted as typical a specimen identified by the late Captain Carmichael, and now in the Kew Herb.

Plants minute, gregarious, of an ochrey brown colour, globular and concave in the young state, and gradually becoming plane or even somewhat convex; substance thick and fleshy, not shrinking much in drying; margin depressed, rounded, entire, somewhat showing a tendency to become lobed; barren or inferior surface smooth, rugose and rather puckered towards the root; hymenium or upper surface appearing as if sprinkled with minute shining particles not unlike small grains of brown sugar. (Grev.)

**Helotium terrigenum.** Cke. & Phil., in Hb. Kew.

Ascophores scattered, shortly stipitate, stem stout, slightly narrowed downwards, at first almost globose, then concave, finally more or less plane, margin often wavy, firm, glabrous, pallid or the disc with a tinge of tan-colour, about 2 mm. broad and high; excipulum parenchymatous, basal cells irregularly polygonal, 6-8  $\mu$  diameter, becoming long and narrow upwards, and running out at the margin into slender hyphae of variable lengths; asci cylindric-clavate, apex slightly narrowed, base attenuated into a slender, usually curved pedicel, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly elliptical, ends rather acute, straight or very slightly bent, 28-32  $\times$  6  $\mu$ ; paraphyses numerous, hyaline, septate, about 2  $\mu$  thick, very slightly thickened at the tip.

*Helotium pileatum*, Karst., Phil., Brit. Disc., p. 160.

On branches buried in the ground in very damp places.

Type specimen in Herb. Kew., examined.

The species described above was at first considered to be a new species by Cooke and Phillips, and the MS. name "*Helotium terrigenum*, C. & P." was given. In Brit. Disc., p. 160, Phillips considers this supposed new species to be identical with *H. pileatum*, Karst., Myc. Fenn., p. 136. In this determination I do not agree with Phillips; Karsten's species differs in colour, scanty paraphyses, and in the tip of the ascus becoming very deep blue with iodine, whereas in *H. terrigenum* the asci are not at all changed in colour by iodine.

**Helotium citrinum.** Fries, Summa Veg. Scand., p. 355; Phil., Brit. Disc., p. 157; Sacc., Syll., viii. n. 910.

Usually crowded, sometimes growing into each other and forming irregular patches, very shortly stipitate, at first clavate and closed, then expanding until almost plane, margin usually upraised when dry, glabrous, 1½-2 mm. across, firm, lemon yellow; excipulum formed of intricately interwoven, hyaline hyphae about 3  $\mu$  thick; asci elongated, narrowly cylindrical, attenuated at the base into a long, slender, crooked pedicel, 8-spored; spores obliquely 1-seriate, or sometimes inclined to become 2-seriate near the tip, hyaline, continuous, elliptical, smooth, 2-4-guttulate, 9-12  $\times$  3-4  $\mu$ ;

paraphyses slender, hyaline, sometimes branched, tips not thickened.

*Octospora citrina*, Hedwig, Musc. Frond., ii. p. 28.

On branches, stumps, naked wood, &c.

Specimens examined from Phil., Elv. Brit., n. 41, and Rehm, Ascom., n. 704.

**Var. pallescens.** Mass.

Ascophore pale yellow or whitish, margin slightly thickened, otherwise as in the type.

*Helotium pallescens*, Fries, Summa Veg. Scand., p. 355; Phil., Brit. Disc., p. 158; Sacc., Syll., n. 879.

On wood, stumps, &c.

Specimen from Fries examined, also specimen in Karst. Fung. Fenn., n. 640.

**Helotium Fuckelii.** Mass.

Gregarious or crowded, sometimes scattered, very shortly stipitate, closed at first but soon expanding, the margin usually crisped and wavy, or sometimes torn, membranaceous and tough, dingy white, or the disc reddish, glabrous, incurved and contracted when dry, up to 1 mm. across; stem very short, firm; hypothecium and excipulum formed of much interlaced, hyaline, slender hyphae; cortex parenchymatous; asci narrowly cylindric-clavate, 8-spored; spores irregularly 2-seriate, hyaline, smooth, continuous, straight or usually slightly curved, narrowly cylindrical,  $6-10 \times 1.5 \mu$ ; paraphyses slender, hyaline, tips not much or at all thickened.

*Peizizella sordida*, Fuckel, Symb. Myc., p. 299.

*Hymenoscypha sordida*, Phil., Brit. Disc., p. 144.

*Phialea sordida*, Sacc., Syll., viii. n. 1112.

On dead leaves of wild rose, broom, bramble, &c.

Specimens examined in Fuckel's Fung. Rhen., n. 2078.

Distinguished by the minute, thin, tough ascophore having the margin more or less wavy, and the small spores. The previous existence of *Helotium sordidum*, Phil., a New Zealand species, necessitated a change in the specific name of the present species, when transferred to the genus *Helotium*. Saccardo—Syll., vii. n. 1112—states that the present species is called *Helotium sordidum* by Rehm, Ascom., n. 414, and if so would have had priority over Phillips's name; this statement, however, is a mistake; Rehm calls the fungus *Peizizella sordida*.

**\*\* Distinctly stipitate.**

**Helotium luteolum.** Currey, Linn. Trans. xxiv., p. 153, t. 25, figs. 11, 12, and 18.

Caespitose, stipitate, concave, soon plane or slightly convex, rather fleshy, margin and stem very minutely downy, 1-2 mm. diameter; hypothecium and excipulum formed of hyaline, stout, septate, interwoven hyphae passing into a pseudoparenchymatous cortex, and running out at the margin into slender, short, parallel hyphae, the tips of which are often rough with particles of oxalate of lime; stem 3-5 mm. long, slender, equal, sometimes branched; every part of fungus pale primrose-yellow, or sometimes straw-colour; asci narrowly cylindric-clavate, apex narrowed, pedicel slender, often crooked, 8-spored; spores irregularly 2-seriate, hyaline, continuous, smooth, straight or slightly curved,  $10-12 \times 2.5-3 \mu$ , narrowly cylindric-fusiform; paraphyses broadly lanceolate, apex more or less acute, 2-3-septate, hyaline  $5-6 \mu$  wide at the broadest part.

*Lachnella luteola*, Phil., Brit. Disc., p. 247.

*Dasyscypha luteola*, Sacc., Syll. viii., no. 1830.

On dead wood and branches in damp places, among moss, &c.

Distinguished by the caespitose habit, uniform pale yellow colour, and more especially by the remarkable paraphyses. Very beautiful specimens of this species were found growing on branches buried among moss near Worcester, by Mr. Carleton Rea, in September 1894. The species is obviously a good *Helotium*, as originally proposed by Currey, in spite of the one deviation presented by the peculiar paraphyses. The minute marginal down is not to be compared with the pilose exterior of species of *Dasyscypha*.

Type specimen examined.

**Helotium aureum.** Pers., Syn. Fung., p. 678; Phil., Brit. Disc., p. 139; Sacc., Syll., viii., n. 912.

Gregarious, stipitate, closed at first, then expanding until almost or quite plane, discoid, rather fleshy, glabrous, dark yellow, 1-2 mm. across; stem  $1\frac{1}{2}-2\frac{1}{2}$  mm. high, slender, almost equal, pale, basal portion coated with delicate down,



glabrous elsewhere; hypothecium and excipulum hyaline, formed entirely of slender, interwoven hyphae, cortex consisting of rather closely septate hyphae, forming oblong cells, running in parallel series from stem to margin; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores mostly obliquely 1-seriate, hyaline, smooth, continuous, straight or very slightly curved,  $9-11 \times 2 \mu$ ; paraphyses slender, hyaline, sometimes forked.

On rotten wood, bark, &c.

Specimen in Herb. Berk., Kew, accepted as typical.

Distinguished from other species having the stem more or less downy or floccose, and by the smaller spores, which may prove to be septate when mature.

**Helotium serotinum.** Fries, Sum., Veg. Scand., p. 355; Rehm, Krypt.-Flora, Disc., p. 781.

Gregarious or crowded, stipitate, closed at first then becoming plano-convex, rather thin, clear yellow, glabrous, 1.5-4 mm. across; stem 2-7 mm. long,  $\frac{1}{2}-\frac{3}{4}$  mm. thick, almost equal, yellow or orange; hypothecium and excipulum composed of slender, interlaced hyphae which become parallel and septate to form the cortex; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, hyaline, continuous, smooth, usually slightly curved, narrowly cylindric-fusiform, ends somewhat pointed, 1-4-guttulate,  $25-35 \times 4-6 \mu$ ; paraphyses slender, hyaline sometimes forked, tips not thickened to any appreciable extent.

*Peziza serotina*, Pers., Syn. Fung., p. 661.

*Helvella aurea*, Bolton, pl. 98?

*Hymenoscypha serotina*, Phil., Brit., Disc., p. 125.

On dead branches of beech, and on dead leaves in damp places.

Somewhat resembling *H. luteolum* in the crowded habit and bright yellow colour of the ascophore, but distinguished by the longer spores and slender, cylindrical paraphyses.

Specimen examined in Fuckel's Fung. Rhen., n. 1157.

**Helotium flavum.** Phil., Brit. Disc., p. 157; Sacc., Syll., viii. n. 915.

Gregarious or scattered, stipitate or nearly sessile, at first closed and piriform, then expanding and becoming saucer-



shaped or almost plane, glabrous; disc bright yellow, externally pallid, about 1 mm. across; stem glabrous,  $\frac{1}{2}$ – $\frac{3}{4}$  mm. across, expanding upwards into the ascophore, consisting of parallel, septate hyphae, which continue outwards and form the cortex of the ascophore; asci elongated, narrowly clavate, pedicel long, slender, 8-spored; spores obliquely 1-seriate, or inclined to be 2-seriate upwards, hyaline, smooth, continuous, rather broadly elliptical, ends somewhat pointed,  $10\text{--}12 \times 5\text{--}6 \mu$ ; paraphyses slender, hyaline, cylindrical septate, sometimes branched, about  $1.5 \mu$  thick throughout.

*Peziza flava*, Klotzsch, MS., in Herb., Kew.

On decorticated wood.

Type specimen examined.

The measurement of the spores— $20 \times 4\text{--}5 \mu$ —is an uncorrected slip for  $10\text{--}12 \times 4\text{--}5 \mu$ , the measurements given by Phillips, along with a figure made when the specimen was examined by him.

**Helotium melleum.** B. & Br., Ann. Nat. Hist., n. 1487, ser. iv., vol. xv., p. 38 (1875); Phil., Brit. Disc., p. 160.

Scattered, shortly stipitate, at first closed, then becoming almost or quite plane, margin often wavy, pale honey colour, glabrous,  $1\text{--}1\frac{1}{2}$  mm. across; hypothecium and excipulum parenchymatous, cortical cells polygonal or subquadrate, almost uniform in size throughout,  $7\text{--}10 \mu$  diameter; asci narrowly clavate, apex narrowed, pedicel long, slender, 8-spored; spores irregularly 2-seriate, smooth, hyaline, narrowly fusiform, ends rather acute, often very slightly bent or with a suggestion of becoming sigmoid, often multi-guttulate,  $28\text{--}32 \times 5\text{--}6 \mu$ ; paraphyses hyaline, about  $1\frac{1}{2} \mu$  thick, scarcely or often not at all thickened at the tips.

*Helotium Fergussoni*, Sacc., Syll., viii. n. 948.

Oh rotten wood.

Type specimen examined.

A very fine and distinct species, well marked by the size and shape of the spores. The present species was published in January, 1875, and later in the same year Berkeley and Broome published a second, quite distinct species from Ceylon as *Helotium melleum*, B. & Br.,—Fung. Ceylon, n. 597; Linn. Soc. Journ., vol. xiv. p. 107.

The name of *H. melleum* has been retained by Saccardo—Syll., viii. n. 948—for the Ceylon species, and the British species, notwithstanding priority of publication, has been changed by Saccardo to *H. Fergussoni*, Sacc., Syll., viii. n. 948.

**Helotium Aspegrenii.** Fries, Summa Veg., p. 355.

Gregarious, stipitate; ascophore subrepand; disc yellow; externally, as well as the subascending stem, white; asci cylindrical; spores 8, oblong or oblong-elliptic, biguttulate,  $8-10 \times 3.5 \mu$ .

*Peziza Aspegrenii*, Fries, Syst., Myc., ii. p. 131.

*Hymenoscypha Aspegrenii*, Phil., Brit. Disc., p. 124.

*Phialea Aspegrenii*, Gill., Disc. Fr., p. 107, with fig.; Sacc., Syll., viii. n. 1078.

On rotten wood.

"Two to three lines high, stem somewhat slender." (Fries.)

At first hemispherical, then expanded and plane; stem slender, attenuated downwards.

Unknown to me. All the above is from Brit. Disc., p. 124-125.

**Helotium Hedwigii.** Mass.

Ascophore stipitate, concave or plane, yellow tinged with orange, margin entire, paler beneath; stem rather long, lower half tomentose, white and enlarged; asci cylindraceo-clavate; spores oblong or oblong-elliptic, biguttulate,  $7-10 \times 3 \mu$ .

*Octospora fungoidaster*, Hedw., Musc. Frond., ii. p. 53, t. xix. figs. 1-4.

*Peziza fructigena*,  $\beta$ . *virgultorum*, Fries, Syst. Myc., ii. p. 118.

*Peziza virgultorum*, Fl. Dan., t. 1016, fig. 2.

*Hymenoscypha Hedwigii*, Phil., Brit. Disc., p. 130.

On twigs of hazel. May.

Ascophore  $\frac{1}{2}-1\frac{1}{2}$  line broad, height about the same. The cups are at first concave, then plane; the stem is white, enlarged at the base, and attached to the wood by white mycelium.

The above is copied entirely from Phillips, Brit. Disc., p. 130. Unknown to me.

**Helotium Broomei.** Mass.

Scattered, stipitate, cyathiform or plane, flesh-red, glabrous, firm; margin entire; stem rather slender, cylindrical, flexuous; asci cylindraco-clavate; spores 8, oblong, rounded at the ends or subfusiform,  $15 \times 5 \mu$ .

*Hymenoscypha Broomei*, Phil., Brit. Disc., pl. 5, fig. 27.

*Phialea Broomei*, Sacc., Syll., viii. n. 1090.

*Peziza araucosa*, Bull., Kew Herbarium.

On dead wood.

Ascophore 1 line broad, 1 line high.

Unknown to me. The above description is entirely from Phillips, Brit. Disc., p. 129. Unfortunately I cannot find the specimen in the Kew Herbarium on which the species would appear to be founded.

**Helotium lutescens.** Fries, Summa Veg. Scand., p. 355; Sacc., Syll., viii. n. 905.

Gregarious or scattered, stipitate, closed at first, then expanding until nearly plane; disc yellow, sometimes with a tinge of brown, externally pale yellow, glabrous, 1-2 mm. across; stem 1-2 mm. long, slender, pale, glabrous, sometimes wavy; hypothecium and excipulum hyaline, consisting of slender interlacing hyphae, passing into a small-celled, parenchymatous cortex; asci clavate, 8-spored; spores hyaline, smooth, continuous, straight, elliptic-oblong, ends obtuse,  $12-16 \times 4-5 \mu$ , irregularly 2-seriate; paraphyses slender, hyaline, very slightly thickened at the tip.

*Octospora lutescens*, Hedwig, Musc. Frond., ii. tab. 9, fig. 3.

*Hymenoscypha lutescens*, Phil., Brit. Disc., p. 131.

On dead branches and wood, often among moss.

When quite young almost cylindrical, then top-shaped, and gradually expanding until nearly or quite plane. Margin incurved when dry. Stem sometimes elongated, slender, and wavy, especially when springing from the underside of a branch.

Bloxam's specimen in Herb. Kew, accepted as typical of the present species by Phillips, examined.

**Helotium uliginosum.** Fries, Summa Veg. Scand., p. 355; Sacc., Syll., viii. n. 945; Karsten, Myc. Fenn., i. p. 121.

Scattered or gregarious, stem short or somewhat elongated, watery-waxy, somewhat firm, ascophore ranging from slightly concave to slightly convex, pallid whitish, or yellowish to ochraceous, dingy testaceous or subferruginous when dry, often flexuous and umbilicate, 2-4 mm. broad; stem livid becoming pale, or pallid, hollow, 1-8 mm. high; asci cylindric-clavate,  $65-90 \times 6-8 \mu$ , apex very slightly or not at all blue with iodine; spores usually obliquely 1-seriate, oblong, generally 2-guttulate,  $7-14 \times 3-4 \mu$ ; paraphyses filiform, slightly incrassated.

*Peziza uliginosa*, Fries, Syst. Myc., ii. p. 138.

*Hymenoscypha uliginosa*, Phil., Grev., xvii. p. 45.

On branches, bark, and wood, especially alder, willow, and ash.

Unknown to me. The above description is copied from Karsten, Myc. Fenn., i. p. 121. Phillips quotes Karsten, Fung. Fenn., n. 639, and if he has actually found specimens agreeing with the above description, then the specimens must be mixed, as in the Kew copy of Karsten's exsicc. I find under n. 639, a totally different fungus with narrowly fusiform spores  $22-25 \times 4-5 \mu$ , multiguttulate, and showing indications of becoming multiseptate, as in *Belonidium*.

**Helotium salicellum.** Fr., Summa Veg. Scand., p. 356; Phil., Brit. Disc., p. 159; Rehm, Krypt.-Fl., Disc., p. 786; Sacc., Syll., viii. n. 941.

Ascophores gregarious, developing under the bark and bursting through, at first subglobose and closed, then expanding and becoming almost or quite plane, substance firm, pallid ochraceous, disc sometimes with a brownish tinge, 1-2 mm. across; stem 1-1.5 mm. long, slender, pale; excipulum and stem composed of more or less parallel, hyaline, septate hyphae, which become thicker and more closely septate at the periphery, and end in closely packed, parallel hyphae of equal length, and about  $4 \mu$  thick at the margin of the excipulum; hypothecium composed of thin, interwoven, colourless hyphae; asci clavate, apex somewhat narrowed, rather thick-walled, 8-spored; spores narrowly cylindric-fusiform, ends acute, straight or slightly curved, hyaline, smooth, 2-4-guttulate, then 1-3-septate,  $28-32 \times 5-7 \mu$ ; irregularly biseriate at the apex of the ascus; para-

physes hyaline, about  $2\ \mu$  thick, tips slightly thickened or not at all.

*Peziza salicella*, Fries, Syst. Myc., ii. p. 133.

On willow branches.

Specimen in Sydow's Myc. March., n. 578, examined.

When the bark is still present the ascophores appear to be almost sessile; but when the bark has fallen away, or is removed, the stem is seen. The periphery of the stem and excipulum, examined superficially, appear to be truly parenchymatous, and consisting of oblong cells,  $12-20 \times 8-10\ \mu$ ; but when examined carefully it is seen that these cell rows separate laterally, and are not organically joined as in true parenchyma.

*Helotium virgultorum*. Karst., Myc. Fenn., i. p. 100; Rehm, Krypt.-Fl., Disc. p. 782.

Gregarious, stipitate, at first subglobose and closed, at length expanding until plane or slightly convex, tough, margin entire; disc yellow, often tinged with red, at length rufous; externally glabrous, pale, 1-4 mm. broad; stem 2-8 mm. long, up to  $\frac{1}{2}$  mm. thick, cylindrical, pale, subfloculose; hypothecium and excipulum hyaline, formed of slender, interwoven hyphae; cortex minutely parenchymatous; asci clavate, slightly narrowed at the apex, 8-spored; spores irregularly 2-seriate, narrowly elliptical, ends rather pointed, or apex rounded and hence very narrowly clavate, straight or very slightly curved, hyaline, smooth, at first continuous, finally 1-septate,  $15-25 \times 4-5\ \mu$ ; paraphyses slender, hyaline, only very slightly thickened at the tip.

*Peziza virgultorum*, Vahl, Flor. Dan., tab. 1016, fig. 2.

*Hymenoscypha virgultorum*, Phil., Brit. Disc., p. 134.

*Phialea virgultorum*, Sacc., Syll., viii. n. 1100.

On dead twigs and branches of various trees.

*Var. fructigenum*. Rehm, Krypt.-Flora, Disc., p. 783.

Differs from the typical form in having a shorter and more slender stem, narrowed downwards, and with a minute white downiness at the base.

*Peziza fructigena*, Bull., Hist. Champ. Fr., p. 236, tab. 228.

*Hymenoscypha fructigena*, Phil., Brit. Disc., p. 135.

*Phialea fructigena*, Sacc., Syll., viii. n. 1097.

On fallen acorns, beechmast, chestnuts, also on fir cones.

The hymenium is usually white at first, afterwards it becomes yellow; the exterior dirty white; the stem is attenuated towards the base, not unfrequently minutely pubescent; the spores vary from clavate to fusiform, straight or slightly curved, with two guttulae, becoming uniseptate. (Phillips.)

Specimens examined in Cooke, Fung. Brit., ed., ii. n. 392, and Rehm, Ascom. nos. 9 and 10.

### **Helotium bolare.** Mass.

Scattered or gregarious, stipitate, globose and closed when young, then expanding until quite plane, firm, rather fleshy, glabrous, margin minutely fimbriate, warm brown, outside ochraceous, with minute wrinkles radiating from the stem, 2-4 mm. across; stem 3-5 mm. long, equal or slightly narrowed below, pale ochraceous, glabrous; hypothecium and epithecium formed of slender, hyaline, interwoven hyphae, passing into a delicate, parenchymatous cortex, the cells narrow and much elongated in the direction from base to margin; asci almost cylindrical, 8-spored; spores 1-seriate, hyaline, smooth, at first continuous and 2-4-guttulate then becoming more or less distinctly many-septate, straight or slightly curved, narrowly elliptical,  $16-18 \times 8-9 \mu$ ; paraphyses slender, thickened up to  $3 \mu$  at the yellowish tips.

*Peziza bolaris*, Batsch, Elench., p. 221, t. 28, fig. 155.

*Ciboria bolaris*, Fekl., Symb. Myc., p. 311.

*Hymenoscypha bolaris*, Phil., Brit. Disc., p. 124.

On fallen branches.

Allied to *H. virgultorum*, but distinguished by the broader spores.

### **Helotium concolor.** Mass.

Scattered, stipitate, hemispherical, thin, firm, pallid or dirty white and pruinose externally; disc pallid, brown; margin minutely fimbriate,  $\frac{1}{4}$ -1 mm. across; stem about  $\frac{1}{2}$  mm. high, rather stout; asci cylindric-clavate, 8-spored; spores irregularly 2-seriate, oblong or subfusiform, hyaline, continuous,  $8-10 \times 2-3 \mu$ ; paraphyses filiform, slender.

*Peziza concolor*, Phil., Grev., viii. p. 102.

*Hymenoscypha concolor*, Phil., Brit. Disc., p. 139.

*Phialea concolor*, Sacc., Syll., viii. n. 1063.



On hard decorticated wood.

Unknown to me. Some additional details over those given by Phillips are derived from a sketch by the author. The cortex consists of parallel hyphae radiating from base to margin. The pruinose outside of the ascophore is due to the presence of white granules.

**Helotium Sowerbyi.** Mass.

Scattered, stipitate, closed and subglobose at first, then expanding and becoming saucer-shaped or almost plane; disc orange-red, externally pale and minutely pulverulent, 3-5 mm. across; stem 1-3 mm. long, pale, gradually expanding upwards into the ascophore; hypothecium and excipulum hyaline, consisting entirely of interwoven hyphae, which pass into a small-celled, parenchymatous cortex; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate upwards, or sometimes almost entirely obliquely 1-seriate, hyaline, smooth, straight or very slightly curved, narrowly elliptic-oblong, ends rather obtuse,  $8-12 \times 4-5 \mu$ , eventually becoming 1-septate; paraphyses slender, hyaline, only very slightly thickened at the tip.

*Peziza araneosa*, Sowerby, *Fungi*, t. 365, fig. 5; Cooke, *Mycogr.*, fig. 55<sup>2</sup>; Phil., *Brit. Disc.*, p. 92.

*Humaria araneosa*, Sacc., *Syll.*, viii. n. 466.

On wood and bark of willow, &c.; often among moss.

Sowerby's specimen now in Herb. Berk., Kew, examined.

Sowerby's fungus is a true *Helotium*, whereas *Humaria araneosa*, the species Sowerby supposed it might possibly be, is a true *Humaria*, growing on the ground, and not yet recorded for Britain.

**Helotium calyculus.** Berk., *Outl.*, p. 372.

Scattered or gregarious, stipitate, at first closed, then expanding until slightly concave or quite plane, rather fleshy and firm; disc clear yellowish brown, externally sometimes a little paler, glabrous, margin incurved when dry, 2-3 mm. broad; stem about 2 mm. long, rather stout, expanding upwards into the base of the ascophore, brown, glabrous; hypothecium and excipulum composed of slender, hyaline, intricately interwoven hyphae, passing into a parenchymatous cortex of oblong cells elongated in the direction from



base to margin; asci cylindric-clavate, apex slightly narrowed, pedicel elongated and slender, 8-spored; spores irregularly 2-seriate, hyaline, continuous, straight or very slightly bent, narrowly elliptic-oblong, or the apex obtuse and with a tendency to become clavate,  $15-18 \times 4-5 \mu$ ; paraphyses slender, hyaline, tips scarcely thickened.

*Peziza calyculus*, Sowerby, Eng. Fungi, pl. 116.

*Hymenoscypha calyculus*, Phil., Brit. Disc., p. 136.

*Phialea calyculus*, Sacc., Syll., viii. n. 1106.

On wood and branches.

Sowerby's type specimen, figured in "English Fungi," pl. 116, examined. This specimen is now in the Berkeley Herbarium, Kew.

Differs from *H. virgultorum* in the glabrous stem and the continuous spores.

**Helotium sublenticulare**, Fries, Summa Veg. Scand., p. 355; Rehm, Krypt.-Flora, Disc., p. 784; Sacc., Syll., viii. n. 942.

Scattered, stipitate, rather firm, at first closed and somewhat clavate, then expanding until quite plane or slightly convex; margin entire, often minutely upraised when expanded, disc varying from being almost white, through pale yellow to pale rusty, externally pale and smooth, when dry the disc is yellowish or brownish, 1-5 mm. across; stem .5-3 mm. long, and up to 1 mm. thick; hypothecium formed of hyaline, interwoven hyphae running out into a pseudo-parenchymatous cortex; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate or sometimes almost obliquely 1-seriate, hyaline, smooth, continuous, narrowly elliptic-fusiform, straight or slightly bent, at first continuous and 2-4-guttulate, ultimately 1-septate,  $15-20 \times 4-5 \mu$ ; paraphyses hyaline, about  $2 \mu$  thick, scarcely at all thickened at the tip.

On bark of birch, also on stumps.

Specimen in Rehm's Ascom., n. 654, examined.

Somewhat resembling *H. ferrugineum*, but distinguished by the larger spores.

**Helotium moniliferum**. Mass. (figs. 36-39, p. 290.)

Ascophores scattered or somewhat clustered, sometimes 2-3 united at the base; stipitate, seated among *Bispora*

*monilioides*; disc closed at first then almost plane, marginate, rather fleshy and waxy, 1–2 mm. across, stem 1–2 mm. long, often slightly curved, everywhere smooth and pale ochraceous, or the disc a little darker; excipulum parenchymatous, cells small and much elongated in a direction parallel to the surface, running out at the margin into slender, parallel hyphae; asci narrowly clavate, apex slightly narrowed and truncate, pedicel elongated, slender, 8-spored; spores obliquely 1-seriate, or 2-seriate near the apex, hyaline, smooth, cylindric-fusiform, ends blunt, 2-guttulate then 1-septate,  $11\text{--}13 \times 4 \mu$ ; paraphyses hyaline, slender, slightly clavate.

*Hymenoscypha monilifera*, Phil., Brit. Disc., p. 130.

*Bisporella monilifera*, Sacc., Syli., viii. n. 1988.

*Conidial condition.* Forming a thin, slightly powdery, blackish-brown effused layer; hyphae or conidiophores short, somewhat conical; conidia barrel-shaped, with 1 thick transverse septum, not constricted, 2-guttulate, sooty-brown,  $20\text{--}22 \times 6\text{--}7 \mu$ .

*Bispora monilioides*, Corda, Icon. Fung., i. p. 9, t. xii., f. 143; Fung. Flor., vol. iii., p. 389, fig. 37, on p. 358.

On hard wood, the cut ends of trunks and stumps, especially oak and beech.

Fuckel founded a new genus—*Bispora*—from the present species, on account of its conidial form being what was previously known as *Bispora monilioides*. This name was changed by Saccardo to *Bisporella*, without any specific reason. The structure of the ascophore is in absolute agreement with that of *Helotium*, and it appears unnecessary to constitute a new genus on the strength of what is in reality only an assumed relationship between the ascigerous condition and *Bispora*.

### **Helotium Carmichaelii. Mass.**

Scattered or caespitose, stipitate, concave then plane and slightly margined, eventually slightly concave and immarginate, up to  $1\frac{1}{2}$  mm. across; disc blackish-brown when dry; externally paler, glabrous; excipulum parenchymatous, cells irregular, small, running out into densely packed, parallel, septate hyphae at the margin, stem  $1\frac{1}{2}\text{--}2$  mm. long, slender, often slightly curved, brown, slightly thickened and

minutely downy at the very base; asci clavate, apex slightly narrowed, slenderly stipitate, 8-spored; spores irregularly biseriate, fusiform or thickened at the apex and becoming clavato-fusiform, sometimes slightly curved, smooth, continuous, hyaline, often guttulate,  $24-28 \times 5 \mu$ ; paraphyses numerous, filiform, apex slenderly clavate and brown.

*Hymenoscypha Carmichaelii*, Phil., Grev., v. 19, p. 106.

*Phialea Carmichaelii*, Sacc., Syll., Suppl. x., n. 4499.

On decayed wood.

Type specimen examined.

The colour given is that of the dried specimen, and may require modification when fresh material is examined.

**Helotium emergens.** Mass. (figs. 26-29, p. 156.)

Scattered or fasciculate, stipitate, hemispherical then expanding, becoming slightly funnel-shaped or almost plane, 1.5 mm. across; disc ochraceous, externally paler and glabrous; excipulum minutely parenchymatous, the cells running out at the margin into densely packed, parallel, septate, hyphae; asci narrowly clavate, apex narrowed, base attenuated into a long, slender pedicel, 8-spored; spores irregularly biseriate, smooth, hyaline, continuous, bluntly fusiform, straight or slightly curved,  $10-14 \times 1.5-2 \mu$ ; paraphyses filiform, about  $1.5 \mu$  thick, hyaline.

*Hymenoscypha emergens*, Cke. & Phil., Brit. Disc., p. 139.

*Phialea emergens*, Sacc., Syll., viii. n. 1108.

On branches, growing on the bark, or emerging through cracks.

Type specimen examined.

The colour is described from the dried specimen, and may not agree in all points with fresh specimens.

Phillips says the specimens emerge from beneath the bark, and this is true of some individuals, but many others are seated on the bark, &c., far away from cracks and chinks.

**Helotium aquaticum.** Currey, Linn. Trans., vol. xxiv. p. 154, t. 25, fig. 19.

Ascophore stipitate, very little broader than the apex of the slender stem, concave, becoming plane or convex, about

1-1.5 mm. across, glabrous; stem 3-4 mm. long, filiform; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores mostly 1-seriate, hyaline, elliptical or sometimes inclined to be narrowly clavate, smooth, continuous, often 2-guttulate,  $13-16 \times 5 \mu$ ; paraphyses slender, scarcely thickened at the tip.

*Hymenoscypha aquatica*, Phil., Brit. Disc., p. 134.

*Phialea aquatica*, Sacc., Syll., viii. n. 1105.

On fragment of stick in water.

Type specimen examined.

The fruit is large for the size of the plant. I cannot remember the colour of the disc, having unfortunately omitted to make a note of it, and the specimens having been kept in spirits, have turned quite black. (Currey.)

#### B. On stems of herbaceous plants.

**Helotium cyathoideum.** Karsten, Myc. Fenn., p. 136.

Scattered or gregarious, stipitate, at first closed and clavate or pear-shaped, then expanding, margin often incurved and minutely pubescent, otherwise glabrous, rather firm and tough, whitish when young then with a tinge of brown,  $\frac{1}{2}-\frac{3}{4}$  mm. across; stem  $\frac{1}{3}-1$  mm. long, rather slender, pale, straight or slightly bent; hypothecium and excipulum hyaline, cortex formed of parallel, septate hyphae radiating from stem to margin; asci narrowly cylindric-clavate, apex slightly narrowed, pedicel short, 8-spored; spores irregularly 2-seriate, straight or slightly curved, hyaline, continuous, sometimes guttulate, very narrowly cylindric-fusiform,  $7-11 \times 1-2 \mu$ ; paraphyses scanty, rather stout, cylindrical, hyaline.

*Peziza cyathoidea*, Bull., Champ. Fr., p. 250, t. 416, fig. 3.

*Hymenoscypha cyathoidea*, Phil., Brit., p. 140, also vars.

*Solani* and *Epilobii*, Phil., Brit. Disc., p. 141.

*Hymenoscypha urticae*, Phil., Brit. Disc., p. 141.

*Hymenoscypha clavata*, Phil., Brit. Disc., p. 141,

*Hymenoscypha cacaliae*, Phil., Brit. Disc., p. 145.

On dead herbaceous stems, &c.

Whatever claims the original forms, given as synonyms here, may have had as to specific individuality, an examination of the exsiccati and authentic specimens on whose authority the so-called species have been added to the British list shows that all belong to one species. Extreme forms undoubtedly look dissimilar, but where the whole of the series of British forms can be examined, it is found impossible to discriminate the species as accepted by Phillips; the distinguishing characters being at most, trivial pocket-lens features.

Distinguished by the slender spores, and the small cup-shaped, stalked ascophore, the margin of which is usually minutely pulverulent and striatulate when young.

**Helotium sublateritium.** B. & Br., Ann. Nat. Hist., n. 1488; Phil., Brit. Disc., p. 161; Sacc., Syll., viii., n. 933.

Scattered or gregarious, very shortly stipitate, soon becoming quite plane, or the extreme margin remaining upturned, glabrous, pale brick-red,  $1-1\frac{1}{2}$  mm. diameter; stem cylindrical, delicately covered with white down, then smooth; hypothecium and excipulum consisting of hyaline, thin, intricately interwoven hyphae that run out into a small-celled cortical parenchyma; asci elongated, narrowly clavate, apex slightly narrowed, pedicel long, slender, 8-spored; spores smooth, hyaline, continuous, elliptic-fusiform, straight or very slightly bent, irregularly 2-seriate above, 1-seriate below,  $24-26 \times 5-6 \mu$ , sometimes 2-guttulate; paraphyses slender, hyaline, scarcely thickened at the tips.

On dead stems of herbaceous plants.

Type specimen examined.

Distinguished by the plane, circular, pale brick-red disc, the paler, minutely wrinkled under surface, and the large spores.

**Helotium scutula.** Karsten, Myc. Fenn., p. 110; Rehm, Krypt.-Fl., p. 792, figs. 1-5, p. 771.

Gregarious or crowded, stipitate, at first closed and roundish or funnel-shaped, soon becoming quite plane, firm, glabrous, yellow with a brick-red tinge,  $\frac{1}{2}-3$  mm. broad; stem slender, equal,  $1-5$  mm. high, smooth, often reddish-brown at the base; hypothecium and excipulum hyaline, composed entirely of interwoven hyphae, and passing into a yellowish

parenchymatous cortex, the cells of which are elongated in the direction from base to margin; asci cylindric-clavate, apex somewhat narrowed, often curved, 8-spored; spores irregularly 2-seriate, hyaline, 2-4-guttulate, at first continuous, finally 1 or more septate, straight or slightly curved, narrowly cylindric fusiform, or the apex blunt, thus forming a narrowly clavate spore,  $18-28 \times 4-5 \mu$ ; paraphyses septate, hyaline, sometimes forked, very slightly thickened at the tip.

*Peziza scutula*, Pers., Myc. Eur., i. p. 284.

*Hymenoseypha scutula*, Phil., Brit. Disc., p. 136.

*Phialea scutula*, Gillet, Disc. Fr., p. 108; Sacc., Syll., viii. n. 1009.

On dead herbaceous stems.

Distinguished from *H. cyathoides* by the larger spores, and from *H. virgultorum* by the slender, equal, glabrous stem. Found on the dead stems of many species of herbaceous plants, but the most typical form occurs on *Artemisia vulgaris*.

Specimens examined in Rehm's Ascom., n. 56, and Rabenh., Fung. Eur., 2105.

*Forma fucata*, Phil., Brit. Disc., p. 137.

Ascophore subhemispherical; margin incurved; disc brownish yellow; externally whitish, stained irregularly with dirty yellow.

On dead stems of *Polygonum* lying in water.

Specimen examined in Phil., Elv. Brit., n. 120.

*Forma lysimachiae*, Phil., Brit. Disc., p. 137.

On dead stems of *Lysimachia vulgaris*.

Specimen examined in Phil., Elv. Brit., n. 120A.

*Forma menthae*, Phil., Brit. Disc., p. 137.

Ascophore plane or convex; disc bright yellow; stem slender; spores  $14-20 \times 3-5 \mu$ , 2-3-guttulate, often pseudo-uniseptate.

Specimen in Elv. Brit., n. 188 (called *Helotium menthae*), examined.

*Forma rudbeckiae*, Phil., Brit. Disc., p. 138.

Ascophore 1 line wide, stem about  $1-1\frac{1}{4}$  lines high, cylindrical, expanding into the base of the cup; spores  $18-25 \times 4-6 \mu$ .

On dead stems of *Rudbeckia*.



Not examined.

The above varieties, established by Phillips, are indistinguishable in the dry condition, and cannot be considered more than mere forms, which depend to a very great extent on a knowledge of the host-plant for their identification. Numerous other forms of the present, and other species have been established by Continental mycologists, the principal feature in most instances being the host on which the fungus happens to be growing. This condition of things has been largely developed and expanded by those who have made it their business to issue dried specimens at so much per 100 specimens, the ultimate object being not so much in the interests of science as that of the individual.

**Helotium herbarum.** Fries, *Summa Veg. Scand.*, p. 356; Phil., *Brit. Disc.*, p. 166; Rehm., *Krypt.-Flora*, *Disc.*, p. 778; Sacc., *Syll.*, viii., n. 883.

Gregarious, sessile, or with a very short stem, at first turbinate and closed, then expanding until plane or slightly convex, firm, glabrous, white, or the disc sometimes more or less yellow; 1-3 mm. broad; hypothecium and excipulum minutely parenchymatous, cortical cells irregularly polygonal, 5-7  $\mu$  diameter; asci narrowly clavate, apex narrowed, pedicel slender, 8-spored; spores irregularly and obliquely 2-seriate, hyaline, smooth, narrowly elliptical, ends rather blunt, usually slightly curved, often 3-4-guttulate, continuous at first, then 1-septate, 10-16  $\times$  2.5-3.5  $\mu$ ; paraphyses hyaline, slender, becoming thickened up to 3  $\mu$  broad at the tip.

*Peziza herbarum*, Pers., *Disp. Meth. Fung.*, p. 72.

On stems of various herbaceous plants lying in damp places.

Distinguished from allied white species by the large spores being 1-septate at maturity. Rehm says the spores become 2- rarely 4-septate.

Specimens examined in Cooke, *Fung. Brit.*, ed. ii., n. 391, and Rehm's *Ascom.*, n. 12.

**Helotium repandum.** Phil., *Brit. Disc.*, p. 161; Sacc., *Syll.*, viii., n. 919.

Ascophore shortly stipitate, plane, repand, thin, pale yellow,



margin sublobate; stem very short, attenuated at the base; asci cylindraceo-clavate; spores 8, subcylindrical or oblong-elliptic,  $7-10 \times 2 \mu$ ; paraphyses filiform, slender.

On *Spiraea ulmaria* in damp places.

Cup about  $\frac{1}{4}-\frac{1}{2}$  a line broad.

Not examined.

**Helotium humuli.** De Notaris, Comm., i. p. 379; Phil., Brit. Disc., p. 167; Sacc., Syll., viii., n. 999.

Scattered or gregarious, sessile or contracted into a very short stem-like base, at first subglobose then becoming slightly concave or plane, sometimes slightly marginate, firm, glabrous, pallid then yellowish, the disc often tinged with tan, up to 1 mm. across; hypothecium and excipulum parenchymatous; asci clavate, apex narrowed when young, becoming broadly rounded at maturity, pedicel slender, usually crooked, 8-spored; spores irregularly 2-seriate, hyaline, elliptical, ends narrowed, straight or curved 2-4-guttulate, rarely 1-septate, straight, or slightly curved,  $15-18 \times 4 \mu$ ; paraphyses hyaline,  $2 \mu$  thick, tips slightly thickened.

*Peziza humili*, Lasch, in Rab., Herb. Myc., ed. i., n. 630.

On dead hop stems.

Allied to *H. virgultorum*, but distinguished by the sessile or subsessile ascophores.

Specimens examined in Rehm, Ascom., n. 60, and Saccardo's Myc. Ven., n. 960.

**Helotium politum.** Phil., Brit. Disc., p. 155; Sacc., Syll., viii. n. 870.

Substipitate, plane or slightly concave, glabrous, white; margin even, obtuse; the short stem gradually enlarged from the base upwards into the cup; asci cylindraceo-clavate; spores 8, elliptical, ends nearly pointed,  $10-13 \times 4-5 \mu$ .

On roots of some small plant under the surface of the soil in a plantation. November.

Ascophore  $\frac{1}{4}-\frac{3}{4}$  of a line broad, the short stem tapering downwards to a point. When moist, shining. (Phil.)

Unknown to me.

C. *On leaves of Dicotyledons.*

**Helotium epiphyllum.** Fries, Summa Veg. Scand., p. 356; Phil., Brit. Disc., p. 163; Rehm, Krypt.-Flora, Disc., p. 795, figs. 1-5, p. 771; Sacc., Syll., viii., n. 925.

Scattered, almost sessile, at first closed, then expanding, and becoming plane or slightly convex, with a delicate margin, 1-4 mm. across; excipulum entirely composed of hyaline, septate, closely interwoven hyphae 5-6  $\mu$  thick; smooth, pale ochraceous, disc often becoming rufescent with age; asci cylindric-clavate, tapering into a rather long, slender pedicel, 8-spored; spores usually irregularly 2-seriate above, 1-seriate below, hyaline, smooth, elliptic-oblong or fusoid, ends obtuse, at first continuous and guttulate, ultimately 1-septate, straight or slightly curved, 14-20  $\times$  4-5; paraphyses septate, about 2  $\mu$  thick, sometimes branched, tips tinged yellow.

*Peziza epiphylla*, Pers., Tent. Disp. Fung., p. 72.

On dead leaves of oak, beech, sweet chestnut, &c.

Specimen in Rehm, Ascom., n. 11, examined.

**Helotium phyllophilum.** Karst., Symb. Myc., p. 239; Phil., Brit. Disc., p. 162 (not of Rehm, Kr.-Fl., Disc., p. 796).

Scattered or gregarious, closed and broadly clavate at first, then expanding and becoming slightly convex, or sometimes quite plane or even slightly convex, up to 1 mm. across; stem short, rather stout, up to 1 mm. long, often slightly curved, sometimes almost absent; glabrous, hyaline white or with a tinge of yellow; excipulum parenchymatous, the cells at the base minute, polygonal, 3-5  $\mu$  across, above arranged in a parallel series, very long and narrow, 10-18  $\times$  3-4  $\mu$  finishing at the margin as free, distinct, curved and parallel hyphae of equal length; asci clavate, 8-spored; spores irregularly 2-seriate above, hyaline, cylindric-fusiform, straight or slightly curved, for a long time continuous, then 1-septate, 10-12  $\times$  2.5  $\mu$ ; paraphyses hyaline, about 2  $\mu$  thick, tips slightly thickened.

*Peziza phyllophila*, Desm., Cr. Fr., ser. i., n. 1159.

*Phialca phyllophila*, Gill., Disc. Fr., p. 105; Sacc., Syll., n. 1046.

On dead, fallen leaves of beech, maple, &c.

The species is very minute, and attached to the veins on the underside of the leaf. Distinguished from allies by the very small, narrow cells of the excipulum.

Specimen in Desm., Cr. Fr., ser. i., n. 1159, examined.

**Helotium phyllogenon.** Rehm, Hedw., 1885, p. 14.

Scattered, pear-shaped and closed at first, becoming gradually expanded and ultimately plane, disc yellow, externally almost white,  $\frac{1}{2}$ – $1\frac{1}{2}$  mm. across, stem slender, 1–1.5 mm. long; excipulum parenchymatous, hyaline, cells usually hexagonal but very much elongated radially, so as to become almost oblong in form,  $14\text{--}24 \times 8\text{--}10 \mu$ , each row terminating at the margin in a slender filament,  $30\text{--}40 \times 3\text{--}4 \mu$ ; asci clavate, base stout, 8-spored; spores hyaline, smooth, irregularly 2-seriate above, narrowly fusiform, sometimes with the widest part near the apex, ends rather obtuse, usually 2-guttulate, then 1-septate, straight or slightly curved,  $10\text{--}15 \times 3\text{--}3.5 \mu$ ; paraphyses hyaline, tips very slightly thickened, about  $3 \mu$ .

*Helotium phyllophilum*, Rehm, Krypt.-Flora, Disc., p. 796.

*Phialea pyxilogena*, Sacc., Syll., viii., n. 1136.

On the veins of decaying poplar leaves.

Specimen in Rehm's Ascom., n. 768, examined.

Quite distinct from *H. phyllophilum* in the longer, slender stem, and more especially in the very large cells of the excipulum.

**Helotium renisporum.** Ellis, Bull. Buff. Soc. Nat. Hist., March, 1875, p. 299.

Scattered, stipitate, subglobose and closed at first, then expanding until saucer-shaped or almost plane, margin very minutely fimbriate, more or less contracted when dry, 2–4 mm. diameter, pale cinnamon or yellowish brown; externally marked with delicate wrinkles radiating from the base; stem 2–4 mm. long, slender, darkest near the base; hypothecium tinged brown, and with the hyaline excipulum, composed of stout, much interwoven hyphae, cortex pseudo-parenchymatous, cells rather large, irregular, tinged brown; asci cylindrical, apex thickened, 8-spored; spores 1-seriate, continuous, 2–3-guttulate, elliptic oblong, slightly curved,

ends obtuse,  $10-12 \times 5-6 \mu$ ; paraphyses slender, hyaline slightly clavate.

*Hymenoscypha renisporum*, Phil., Brit. Disc., p. 143.

*Ciboria renispora*, Sacc., Syll., viii. n. 841.

*Ciboria Sydowiana*, Rehm, Hedw. 1885, p. 226; Krypt.-Flora, Disc., p. 758; Sacc., Syll., viii. n. 840.

On fallen and decaying oak leaves, especially on the petiole and veins.

Specimens examined in Ellis, N. Amer. Fung., n. 2049, and Rehm, Ascom., n. 802.

**Helotium punctiforme.** Phil., Brit. Disc., p. 168.

Scattered, sessile and attached by a central point, at first globose then almost or quite plane, margin often slightly wavy, thin, glabrous, whitish or yellowish,  $\frac{1}{4}-\frac{1}{3}$  mm. across; excipulum consisting of very slender, interwoven hyphae, cortex parenchymatous, cells  $5-6 \mu$  diameter; asci clavate, apex narrowed, pedicel long, slender, 8-spored; spores obliquely 2-seriate, hyaline, continuous, linear-elliptical,  $9-12 \times 2 \mu$ ; paraphyses slender, apex slightly thickened, hyaline.

*Peziza punctiformis*, Grev., Scot. Crypt. Flora, p. 63, pl. 63.

*Pseudohelotium punctiforme*, Sacc., Syll., viii. n. 1229?

*Pezizella punctiformis*, Rehm, Krypt.-Flora, Disc., p. 664?

On dead oak leaves.

Species in Herb. Berk., Kew, accepted as typical.

**Helotium immutabile.** Fckl., Symb. Myc., App. i., p. 50; Phil., Brit. Disc., p. 162; Sacc., Syll., viii. n. 986.

Epiphyllous, scattered, sessile or narrowed into a very short stem-like base, disc soon plane and discoid, circular or slightly wavy, margin acute, glabrous, pale yellow, remaining unchanged or with an amber tinge when dry, about 1 mm. across, cortex composed of long, narrow cells arranged in parallel series from base to margin; asci narrowly clavate, tapering gradually from apex to base, 8-spored; spores 1-seriate, or irregularly 2-seriate upwards, hyaline, continuous, narrowly elliptical, ends rather blunt,  $10-12 \times 3-4 \mu$ ; paraphyses hyaline, almost cylindrical, about  $2 \mu$  thick.

On dead leaves of *Populus tremula*; also on oak leaves, along with *Helotium epiphyllum*, in Rehm, Ascom., n. 152.

Specimen examined in Fuckel's Fung. Rhen., n. 2388.

Allied to *H. epiphyllum*, but distinguished by the smaller obtusely pointed spores.

**Helotium albidum.** Pat., Tab. Anal. Fung., 382; Rehm, Krypt.-Flora, Disc., p. 797.

Gregarious or scattered, at first subglobose and closed, then becoming plane or slightly convex, margin entire, ivory-white, 1-2 mm. across; stem slender, up to 1 mm. long, sometimes brownish at the base; excipulum parenchymatous, cells at base irregularly polygonal, those at the sides parallel and radially elongated,  $10-16 \times 6-8 \mu$ ; asci clavate, apex narrowed, 8-spored; spores smooth, hyaline, elliptic-oblong or elliptic-fusiform, usually slightly curved, continuous and 2-3-guttulate, then 1-septate,  $15-18 \times 3-4 \mu$ , irregularly 2-seriate above; paraphyses hyaline,  $3 \mu$  across at the slightly thickened tip.

*Peziza albida*, Roberge, in Desm., Crypt. France, ser. i., n. 2004.

*Hymenoscypha albida*, Phil., Brit. Disc., p. 138.

On petioles of fallen ash leaves.

Specimen from Roberge, in Herb. Kew, examined; Desm. n. 2004 is identical.

**Var. aesculi**, Phil., Brit. Disc., p. 138.

Spores larger than in the typical form,  $20-23 \times 4-5 \mu$ , and more frequently clavate.

On petiole of horse-chestnut leaf.

**Helotium ilicis.** Phil., Brit. Disc., p. 164; Sacc., Syll., viii. n. 987.

Ascophores scattered, sessile and fixed by a central point, at first subglobose and closed, then expanding and becoming plane or slightly convex, margin distinct, rather thick, often wavy, smooth, up to  $\frac{1}{2}$  mm. across; hypothecium composed of densely interwoven hyphae; base of excipulum minutely but distinctly parenchymatous, passing into parallel, closely packed narrow hyphae at the sides; disc almost egg-yellow, margin paler; asci cylindric-clavate, apex narrowed, pedicel rather stout, 8-spored; spores irregularly biseriate above, fusiform, ends rather blunt, hyaline, 2-guttulate, finally

1-septate,  $6-10 \times 2-5 \mu$ ; paraphyses hyaline, about  $2 \mu$  thick, tips not thickened.

*Helotium epiphyllum*, var. *ilicis*, Phil., Elv. Brit., n. 134.

On dead holly leaves.

Specimen in Phil., Elv. Brit., n. 134.

Becoming dingy ochraceous-orange when dry.

#### D. *On beech mast.*

**Helotium fagineum.** Fries, Summa Veg. Scand., p. 356; Phil., Brit. Disc., p. 159; Rehm, Krypt.-Flora, Disc., p. 777; Sacc., Syll., viii. n. 852.

Ascophores gregarious, shortly stipitate or sessile, subglobose and closed at first, then becoming plane or even slightly convex, glabrous, firm, whitish or with a yellow tinge, 1-3 mm. broad; cortex parenchymatous, cells polygonal,  $6-10 \mu$  diameter; asci narrowly clavate, apex narrowed, 8-spored; spores irregularly 2-seriate above, usually 1-seriate below, smooth, hyaline, continuous, straight, often with two minute oil-globules, elliptic-oblong or widest near the apex and narrowly egg-shaped, ends obtuse,  $10-12 \times 4-5 \mu$ ; paraphyses hyaline, slightly thickened upwards,

*Peziza faginea*, Pers., Tent. Disp. Meth. Fung., p. 34.

On fallen beech-mast.

Specimen in Rehm's Ascom., n. 410, examined.

*Phialea fructigena* differs from the present species in the longer, slender stem, and in the longer spores becoming 1-septate at maturity.

#### E. *On fallen catkins.*

**Helotium amenti.** Fekl., Symb. Myc., p. 313.

Ascophore scattered, stipitate, concave, then plane or slightly convex, thin but rather firm; whitish, becoming dingy with age, glabrous, up to  $\frac{1}{2}$  mm. across; cortex parenchymatous, cells narrow and much elongated in the direction from base to margin; stem very short, expanding upwards into the ascophore; asci cylindric-clavate, 8-spored; spores 2-seriate near the top of the ascus, 1-seriate below, hyaline, smooth, continuous, straight, elongated and nar-

rowly egg-shaped, or narrowly piriform,  $7-10 \times 3-4 \mu$ ; paraphyses hyaline, about  $3 \mu$  at the slightly thickened tips.

*Phialea amenti*, Sacc., Syll., viii. n. 1060.

*Hymenoscypha amenti*, Phil., Brit. Disc., p. 143.

On dead, fallen catkins of willow. In Germany this species also occurs on catkins of *Populus tremula*, and Saccardo says also on alder catkins.

Specimens examined in Phil., Elv. Brit., n. 123, and Rehm, Ascom., n. 57.

Distinguished from allied species by the straight, narrowly egg-shaped spores.

**Helotium alniellum.** Karst., Symb. Myc. Fenn., p. 239; Phil., Brit. Disc., p. 155.

In clusters of 2-5 or scattered, very shortly stipitate, at first turbinate and closed, then almost or quite plane, often irregular from mutual pressure, discoid when solitary, glabrous, firm; whitish, disc sometimes with a tinge of yellow; stem very short, slender, sometimes reduced to a central point; cortex parenchymatous, cells irregularly polygonal and  $6-8 \mu$  across near the base, becoming long and very narrow towards the margin; asci clavate, slightly narrowed at the tip, pedicel stout, 8-spored; spores 2-seriate or sometimes almost obliquely 1-seriate, hyaline, smooth, continuous, elliptical, ends rather blunt, straight,  $6-10 \times 2.5-3 \mu$ ; paraphyses slender, hyaline, slightly thickened upwards.

*Phialea alniella*, Sacc., Syll., viii. n. 1059; Rehm, Krypt.-Flora, Disc., p. 721.

On fallen catkins of *Alnus glutinosus*.

Specimen in Rab., Fung. Eur., n. 1122, examined.

Distinguished from *H. amenti* by the spores being elliptical, and not narrowly egg-shaped.

#### F. On grasses or sedges.

**Helotium gramineum.** Phil., Brit. Disc., p. 155; Sacc., Syll., viii. n. 952.

Stipitate; ascophore plane or convex, glabrous, pallid-ochraceous; stem short, rather stout, often slightly attenu-



ated in the centre, expanding into the base of the ascophore; asci subclavate; spores 8, elliptical, 1-2-guttulate,  $8-11 \times 4-5 \mu$ ; paraphyses slenderly filiform.

On grass. Spring.

Cups  $\frac{1}{2}-1\frac{1}{4}$  of a line broad, about the same high; margin obtuse. (Phil.)

Not examined.

### **Helotium nitidulum.** Mass.

Scattered, stipitate, subglobose and closed, then becoming cup-shaped, often irregular and nearly plane, pale tan, rather firm, externally very delicately powdered with glistening meal,  $\frac{1}{2}-1$  mm. broad and high, stem short, equal, coloured like the ascophore; hypothecium and excipulum minutely parenchymatous, cortical cells small, irregularly hexagonal, elongated in the direction from stem to margin, almost hyaline; asci small, narrowly cylindric-clavate, apex slightly narrowed, base short, stout, 8-spored; spores irregularly 2-seriate, hyaline, smooth, continuous, straight or slightly curved, narrowly elliptical, ends rather acute,  $7-10 \times 3 \mu$ ; paraphyses hyaline, slender, very slightly thickened at the tip.

*Peziza nitidula*, B. & Br., Ann. Nat. Hist., n. 570, ser. ii., vol. vii. p. 15.

*Hymenoscypha nitidula*, Phil., Brit. Disc., p. 142.

*Phialea nitidula*, Sacc., Syll., viii. n. 1115.

On dead leaves of *Aira caespitosa*. Winter.

A minute species, nestling in the furrows of the leaf, and characterised more especially by the delicate, glistening meal on the outside of the ascophore.

Type specimen examined.

### **Helotium flexuosum.** Mass.

Gregarious or scattered, sessile or narrowed to a very short, central, stem-like base, closed at first but soon becoming quite plane, the margin often flexuous and the surface more or less undulated; disc dull orange-yellow or rarely clear deep yellow, under surface smooth, yellowish white,  $\frac{1}{2}-1\frac{1}{2}$  mm. across; excipulum and hypothecium hyaline, consisting of stout, closely interwoven hyphae, running out into a small-celled parenchymatous cortex; asci narrowly cylindric-clavate, apex somewhat narrowed, 8-spored; spores

irregularly 2-seriate, hyaline, continuous, smooth, straight or very slightly curved,  $8-10 \times 1.5 \mu$ ; paraphyses slender, hyaline, very slightly incrassated at the tip.

On the stems of grasses—*Dactylus*, &c.—near the root.

Distinguished from *H. rhizophilum*, with which it was mixed in the Kew herbarium, by the absence of a stem, undulating disc, and smooth exterior. Probably not uncommon; specimens are noted from Surrey and Norfolk.

***Helotium rhizophilum*.** Cke., Hdbk., n. 2155.

Scattered or gregarious, stipitate, at first closed and pear-shaped, finally expanding until nearly or quite plane, margin even, entire; disc clear deep yellow, externally pale, covered with a delicate, whitish down, 2–3 mm. across; stem 4–7 mm. long, slightly narrowed at the base as a rule, pale and downy; asci narrowly clavate, apex slightly pointed, pedicel slender, 8-spored; spores irregularly 2-seriate, hyaline, continuous, cylindrical, straight,  $12 \times 2 \mu$ ; paraphyses hyaline, slender, not thickened upwards.

*Ciboria rhizophila*, Fuckel, Symb. Myc., p. 312.

*Hymenoscypha rhizophila*, Phil., Brit. Disc., p. 144.

On rhizomes of various grasses.

Specimen examined in Fekl., Fung. Rhen., n. 1598.

Distinguished from allies by the bright yellow disc, minutely downy exterior and long stem, and habitat.

***Helotium eburneum*.** Gillet, Disc. Fr., p. 160.

Scattered or gregarious, minute, ivory-white, almost globose and closed at first, then expanding, glabrous, margin minutely fimbriate, soft, about  $\frac{1}{4}-\frac{1}{3}$  mm. across; stem short, slender, often more or less incurved; cortex minutely parenchymatous, cells elongated in the direction from base to margin, and running out at the edge, into short, slender hyphae of irregular length; asci narrowly cylindric-clavate, apex slightly pointed, 8-spored; spores irregularly 2-seriate, hyaline, continuous, straight or slightly bent, narrowly cylindrical,  $4-5 \times 1 \mu$ ; paraphyses slender, cylindrical, hyaline.

*Peziza eburnea*, Roberge, in Desm., Crypt. France, ed. i., n. 2004, and in Ann. Sci. Nat., 1851, p. 323.

*Hymenoscypha eburnea*, Phil., Brit. Disc., p. 145.

*Phialea eburnea*, Sacc., Syll., viii. n. 1065.

On leaves of grasses, as *Holcus* and *Dactylis*; also on *Carex pendula*.

Distinguished by the small size, ivory-white colour of every part, and the minute spores.

G. *On Gymnosperms.*

**Helotium sulphuratum.** Phil., Brit. Disc., p. 161; Sacc., Syll., viii. n. 917.

Scattered or gregarious, shortly stipitate or sometimes sessile, at first subglobose and closed, then expanded and becoming slightly concave, margin more or less raised, entire, glabrous, firm, pale lemon-yellow,  $1\frac{1}{2}$ – $2\frac{1}{2}$  mm. across; hypothecium composed of hyaline, slender, densely anastomosing hyphae, passing into a parenchymatous cortex, cells polygonal,  $7$ – $10\ \mu$  diameter; asci elongated, narrowly clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, smooth, hyaline, continuous, multiguttulate, narrowly elliptical, ends rather pointed, straight or very slightly curved,  $15$ – $21 \times 5\ \mu$ ; paraphyses hyaline, slender, apex slightly thickened,  $3$ – $4\ \mu$  thick.

*Peziza sulphurata*, Schum., Saell., p. 428.

On dead, fallen pine leaves.

Colour pale sulphur- or lemon-yellow; stem sometimes quite distinct, but short, at others almost entirely absent.

**Helotium advenulum.** Phil., Grev., vi. p. 24.

Scattered or gregarious, minute, hemispherical, then concave or almost plane, white with a tinge of dingy yellow, about  $\frac{1}{4}$  mm. across, rather tough, glabrous; stem slender, often rather curved, glabrous, up to  $\frac{1}{3}$  mm. long; excipulum parenchymatous, cells irregular, rather large; asci clavate, apex rather abruptly narrowed, 8-spored; spores irregularly biseriate upwards, elliptic-oblong, ends obtuse, straight or slightly curved, hyaline, continuous,  $8$ – $10 \times 2.5$ – $3\ \mu$ ; paraphyses filiform, about  $2\ \mu$  thick, tip not thickened, hyaline.

*Hymenoscypha advenula*, Phil., Brit. Disc., p. 133.

*Phialea advenula*, Sacc., Syll., viii. n. 1056.

On fallen decaying larch leaves. Spring.

Specimen in Phillips' Elv. Brit., n. 133, examined.

**Helotium subtile.** Fries, Obs. Myc., ii. p. 310.

Usually gregarious, stipitate, closed at first, then expanding and becoming plane or slightly convex and concave underneath, up to 1 mm. across, white, glabrous; excipulum parenchymatous, cells very delicate and small, radially elongated; stem cylindrical, slender, usually straight, up to 2 mm. long; asci narrowly cylindric-clavate, apex rounded, 8-spored; spores irregularly biseriate, narrowly fusiform, straight or very slightly curved, hyaline, continuous, smooth,  $6-8 \times 1.5 \mu$ ; paraphyses slender,  $1.5 \mu$  thick, apex not thickened, hyaline.

*Peziza subtilis*, Fries, Syst. Myc., ii. p. 157.

*Hymenoscypha subtilis*, Phil., Brit. Disc., p. 132.

*Phialea subtilis*, Gillet, Champ. Fr., Disc., p. 161; Sacc., Syll., viii. n. 1053.

On decaying leaves of conifers. Autumn.

Specimen in Roum., Fung. Gall., Exs., 1056, and Fuckel, Fung. Rhen., n. 1160, examined.

Allied to *P. advenula*, but the ascophore is larger, and the asci and spores smaller; the cells of the parenchyma are also much smaller in the present species.

**Helotium conigenum.** Fries, Summa Veg. Scand., p. 355; Phil., Disc., p. 167; Sacc., Syll., viii. n. 898.

Gregarious and often confluent, sessile or furnished with an exceedingly short stem-like base, closed at first, then expanding until plane or slightly convex, rather firm, glabrous,  $\frac{1}{2}$ – $1\frac{1}{2}$  mm. across, pale yellow or pallid; excipulum and hypothecium formed of slender, hyaline, interwoven hyphae, passing into a parenchymatous cortex, the cells running out at the margin into free hyphae,  $20-30 \times 4-5 \mu$ , hyaline, and having the tips slightly clavate; asci narrowly clavate, the tip somewhat narrowed, 8-spored; spores 3-seriate above, hyaline, continuous, often slightly bent, narrowly cylindric-fusiform,  $6-8 \times 1.5-2 \mu$ ; paraphyses slender, hyaline, tip very slightly or not at all thickened.

*Peziza conigena*, Pers., Syn., p. 634.

On fallen fir cones, lying in damp spots.

A distinct species, well marked by habitat and the small spores. *H. virgultorum*, var. *conigenum* also grows on the scales of cones, but is distinguished by the stipitate ascophore and the much larger spores.

**Helotium strobilinum.** Mass.

Ascophore stipitate, gregarious, at first clavate and closed, then expanding, the disc becoming almost or quite plane and surrounded by a very delicate margin which does not become much incurved when dry; disc pallid, externally glabrous, somewhat shining, blackish-olive, becoming paler towards the margin,  $\frac{1}{2}$ – $\frac{3}{4}$  mm. across, stem slender, blackish, about  $\frac{1}{2}$  mm. high; hypothecium and excipulum parenchymatous, cortical cells coloured, very long and narrow, passing upwards into parallel, greyish hyphae; asci narrowly clavate, apex contracted and thick-walled, 8-spored; spores irregularly 2-seriate upwards, hyaline, continuous, narrowly elliptical, ends rather pointed,  $11-13 \times 3-4 \mu$ ; paraphyses hyaline, slender, slightly thickened at the tip.

*Peziza strobilina*, Fries, Syst. Myc., ii. p. 125.

*Hymenoscypha strobilina*, Phil., Brit. Disc., p. 133.

On scales of fallen cones of fir.

Disc at first urceolate, afterwards more expanded; the texture is tough, and when dry the plant is rigid and black. (Phil.)

Specimen examined in Phil., Elv. Brit., n. 40.

**H. On Cryptogams.**

**Helotium marchantiae.** Fries, Summa Veg. Scand., p. 356; Phil., Brit. Disc., 164; Sacc., Syll., n. 1012.

Scattered or solitary, sessile but attached by a narrowed base, fleshy, becoming almost plane, but more or less marginate, glabrous, sometimes wavy at the margin; pale yellowish-brown, disc usually darker when dry; excipulum parenchymatous, cells irregularly polygonal and largest towards the outside where they measure  $15-25 \mu$ ;  $1-1\frac{1}{2}$  mm. diameter; asci elongated, narrowly cylindrical, tapered and often wavy at the base, 8-spored; spores obliquely uniseriate, hyaline, continuous, smooth, elliptic-oblong,  $12-15 \times 3-4 \mu$ ; paraphyses filiform, very slightly thickened upwards, hyaline,  $3 \mu$  thick.

*Peziza marchantiae*, Berk., Engl. Fl., vol. v. p. 204.

On fading *Marchantia polymorpha*.

Type specimen examined.

**Helotium rhodoleucum.** Fries, Summa Veg. Scand., p. 335.

Scattered, stipitate, almost globose and closed at first, then becoming quite plane, thin and rather soft, glabrous, entirely pale rosy-white,  $\frac{1}{2}$ – $1\frac{1}{2}$  mm. across; stem 1–2 mm. long, slender, glabrous, composed of parallel, slender, septate hyphae, which expand at the apex and form the cortex of the ascophore; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, hyaline, continuous, smooth, narrowly elliptical, ends slightly pointed,  $10\text{--}14 \times 3\cdot5\text{--}4 \mu$ ; paraphyses hyaline, slender, sometimes forked, tips scarcely or not at all thickened.

*Peziza rhodoleuca*, Fries, Obs. Myc., ii. p. 306.

*Hymenoscypha rhodoleuca*, Phil., Brit. Disc., p. 131.

On dead *Equisitum* stems and other fragments of vegetation in damp places.

When young the plant is closed and subglobose or pear-shaped, soon expanding and becoming plane or slightly convex. Distinguished by the pale, clear rosy-white colour.

Specimens examined in Karsten's Fung. Fenn., n. 152, and Sydow, Myc., March., n. 1266.

**Helotium phascoides.** Fries, Summa Veg. Scand., p. 355; Phil., Brit. Disc., p. 169; Sacc., Syll., viii. n. 954.

Ascophores gregarious, minute, waxy, shortly stipitate, turbinate and closed, then expanding until plane, glabrous, with a brick-red or vinous tinge all over (when dry),  $\frac{1}{2}$ – $\frac{3}{4}$  mm. broad and high; hypothecium and excipulum composed of stout, hyaline, interwoven hyphae; asci cylindric-clavate, apex rounded, pedicel slender, often crooked, 8-spored; spores irregularly 2-seriate, hyaline, smooth, continuous, narrowly elliptic-oblong, ends somewhat pointed, straight or slightly curved,  $10\text{--}12 \times 4\text{--}5 \mu$ ; paraphyses slender,  $1\frac{1}{2}$ – $2 \mu$  thick, apex not thickened.

*Peziza phascoides*, Fries, Syst. Myc., ii. p. 138.

On leaves of species of *Phascom*.

Specimen in Herb. Berk., Kew, accepted as typical. Readily distinguished by the reddish colour of the ascophore and the peculiar habitat.



**Helotium bryophylum.** Mass.

Stipitate, slender, at first concave, then convex, glabrous, yellowish; stem long, slender, flexuose, slightly pubescent; asci clavate; spores cylindrical, curved,  $10 \times 2 \mu$ ; paraphyses filiform, enlarged upwards, septate.

*Peziza bryophila*, Fries, Syst. Myc., ii. p. 119.

*Peziza pyxidata*, Flora Dan., t. 1017, fig. 1.

*Phialea bryophila*, Gill., Champ., p. 100.

*Hymenoscypha bryophila*, Phil., Brit. Disc., p. 125.

Amongst moss in mountain pastures. Autumn.

Cup  $\frac{1}{2}$  to  $1\frac{1}{2}$  lines broad,  $2\frac{1}{2}$  to 5 lines high. Scattered, slender, nearly white, becoming yellowish. (Phil.)

Unknown to me. The whole of the above copied from Phillips, Brit. Disc., p. 125.

**I. On dung.****Helotium lacteum.** Mass.

Ascophores scattered, substance thin, almost translucent when moist, obconic and closed at first, then expanding, finally slightly concave, plane, or with the margin drooping, glabrous, whitish or with a very faint yellow tinge, hypothecium and excipulum composed of slender, hyaline hyphae about  $4 \mu$  thick, these run more or less parallel near the surface, and pass into a parenchymatous cortex of small cells, elongated in the direction from base to margin; asci cylindric-clavate, pedicel slender, short, 8-spored; spores elliptical, smooth, hyaline, 1-seriate or somewhat inclined to be 2-seriate sometimes near the top of the ascus,  $9-10 \times 4.5-5 \mu$ ; paraphyses hyaline, slender, very slightly thickened at the tips.

*Ascobolus (Ascophanus) lacteus*, Cke. & Phil., Grev., vol. v. p. 119.

*Ascophanus lacteus*, Phil., Brit. Disc., p. 306.

On cow dung.

Type specimen examined, also specimen in Cooke's Fung. Brit., ed. ii., n. 660.

The structure of the excipulum, also the thin substance of the ascophore prevent the present fungus from being retained in the *Ascoboleae*.



*Doubtful species.*

**Helotium fibuliforme.** Berk., Outl., p. 371; Sacc., Syll., viii. n. 1032; Phil., Brit. Disc., p. 156.

Ascophore stipitate, convex, yellow, fleshy, rather firm; dark brown beneath, as well as the short, thick, subvillose stem; asci cylindraceo-clavate; spores oblong or fusiform, 2-guttulate,  $9-12 \times 2-4 \mu$ .

*Helvella fibuliformis*, Bolton, p. 176, t. 176.

On sticks of elm in water; also on ash in like situations.

Ascophore  $1\frac{1}{2}$ –3 lines broad, about  $2\frac{1}{2}$  lines high.

The above is the description given by Phillips of what he considers to be the fungus Bolton had in view. Unknown to me.

It consists of a little hard pileus, smooth, slippery, and of a yellow-ochre colour on the upper side. It is supported by a round stem, a line in length; of a solid and firm consistence; and together with the under side of the pileus, is of a dusky black. (Bolton.)

**Helotium subsessile.** Schum., Saell., p. 415; Phil., Brit. Disc., p. 158; Sacc., Syll., viii. n. 875.

Caespitose, very minute, pallid, pileus plane at first then slightly convex, disc pale umber; stem very short, apex dilated, base umber-bay.

On fallen rotting twigs. Pileus not  $\frac{1}{2}$  a line broad. Flesh brownish.

The above is Schumacher's description of the species, which was afterwards figured by Hornemann in *Flora Danica*, pl. 1855, fig. 3; referred to *Peziza helotioides*, Fr., Syst. Myc., vol. iii. p. 135, and described as follows. "Small, pallid, plano-convex, disc pale umber, stem very short, base umber-bay.

Berkeley and Broome met with a fungus growing on a dead branch which they referred to *P. helotioides*, Fr., as follows in Ann. Nat. Hist., n. 573, ser. ii., vol. vii. p. 15:—Our plant agrees very well with that of Schumacher, who has alone described and figured the species. It is however of a dull ochre rather than umber; the stem is very thick, obconical, and merely a prolongation of the pileus; the

hymenium convex, the asci clavate, and the sporidia oblong, sublanceolate, with two or more nuclei. (B. & Br.)

Cooke—Hdbk., p. 714—without seeing a specimen, drew up a diagnosis from the characters given by Schumacher and Berkeley and Broome. This description is reproduced with a slight modification in the arrangement of words by Phillips—Brit. Disc., p. 158—to whom the fungus was unknown. Finally, Saccardo, to whom the fungus was also unknown, gives the substance of all previous writers in his diagnosis in Sacc., Syll., viii. n. 875.

Unknown to me.

*Helotium tuba*. Fries, Summa Veg. Scand., p. 355.

This beautiful little peziza adheres by a claw at the base to the putrid stems of decayed plants in moist places near rills of water. It is shaped like a trumpet in miniature. The height about half an inch. The colour a bright pale yellow. (Bolton.)

*Peziza tuba*, Bolton., Hist. Fung., iii. t. 106, fig. 1.

*Hymenoscypha tuba*, Phil., Brit. Disc., p. 126.

*Phialea tuba*, Sacc., Syll., viii. n. 1076.

The above is all that is known respecting Bolton's *P. tuba*, hence it is not likely to be recognised again with certainty.

#### *Excluded species.*

*Helotium buccina*, Fries, Summa Veg. Scand., p. 355; Phil., Brit. Disc., p. 170; Sacc., Syll., viii. n. 911.

Whatever the species kept up by some Continental writers may be, it is quite certain that the British specimens considered as this species by Berkeley do not belong to the Discomycetes.

*Helotium sclerotoides*, Berk., Outl., p. 371; Phil., Brit. Disc., p. 171; Sacc., Syll., viii. n. 960.

Examination of the type specimen proves this to be a true sclerotium.

#### CYATHICULA. De Notaris.

Ascophore firm and somewhat waxy, sessile or shortly stipitate, glabrous with the exception of a single row of

teeth round the margin; hypothecium and excipulum formed of intricately interwoven hyphae, cortex similar, the hyphae running out in a more or less parallel manner to form the marginal teeth; asci 8-spored; spores 2-seriate, smooth, hyaline, elongated, continuous or septate; paraphyses absent in some species.

*Cyathicula*, De Not., Prof. Disc. in Comm., i. p. 381; Sacc., Syll., viii. p. 304.

*Hymenoscypha*, Phil., Brit. Disc. (in part).

The distinctly toothed margin of the ascophore is the most eharacteristic feature of the present genus. The hypothecium, excipulum, and cortex being entirely composed of interwoven hyphae is also remarkable. In all probability the spores of *C. coronata* will prove to be septate when quite mature. *C. dentata* is not a typical species, and connects the present genus with *Mollisia*.

*Cyathicula coronata*. De Notaris, Disc., p. 381; Sacc., Syll., viii. n. 1270.

Scattered, stipitate, closed and subglobose at first, then expanding and becoming cup-shaped; glabrous except the margin, which is surrounded by 12-18 elongated, slender teeth, 25-40  $\mu$  long, 15-18  $\mu$  broad at the base and soon narrowing down to an elongated, bristle-like spine 8-12  $\mu$  broad, more or less incurved, and strongly so when dry; pallid or with a tinge of yellow, 1½-3 mm. across, teeth sometimes whitish; hypothecium and excipulum formed of continuous intricately interwoven hyaline hyphae, cortex similar, the hyphae running out to form the marginal teeth; stem slender, 2-3 mm. long; asci elongated, narrowly cylindric-clavate, pedicel long and slender, 8-spored; spores biseriate near the tip, uniseriate below, smooth, hyaline, continuous, narrowly elliptical, ends acute, straight or slightly curved, 15-20  $\times$  4  $\mu$ ; paraphyses slender, hyaline, not thickened at the tip.

*Peziza coronata*, Bull., Champ. Fr., p. 251, t. 416, f. 4.

*Peziza inflexa*, Bolton, t. 106, fig. 2.

*Hymenoscypha coronata*, Phillips, Brit. Disc., p. 127; pl. v. fig. 26.

*Hymenoscypha coronata*, var. *inflexa*, Phil., Brit. Disc., p. 127.

On various kinds of dead herbaceous stems.

Specimens examined in Cooke, Fung. Brit., exs., n. 379, and Fuckel's Fung. Rhen., n. 1183.

Readily distinguished from *C. peristomalis* by the bristle-like marginal teeth, which are incurved when dry.

**Cyathicula petiolorum.** Sacc., Syll., viii. n. 1273.

Ascophore stipitate, scattered or solitary, closed at first, then concave, finally plane, margin minutely toothed, glabrous; disc yellowish brown or tawny, externally except the margin paler, 1-2.5 mm. across; stem slender 2-6 mm. long, smooth; hypothecium tinged brown; cortex composed of slightly wavy, septate hyphae that radiate from base to margin, where they become free, tinged brown, obtuse, or inclined to clavate, septate, and form the irregularly triangular marginal teeth; asci subcylindrical, apex slightly narrowed, 8-spored; spores usually 1-seriate, hyaline, continuous, narrowly cylindric-oblong or sausage-shaped, rather strongly curved,  $16-18 \times 4 \mu$ ; paraphyses hyaline, about  $2 \mu$  thick, apex only very slightly thickened.

*Peziza petiolorum*, Roberge, in Desm., Crypt. France, ed. i., 1158.

*Hymenoscypha petiolorum*, Phil., Brit. Disc., p. 132.

On petioles of fallen beech and oak leaves.

The margin is furnished with minute, somewhat triangular teeth, easily overlooked in dried specimens. (Phil.)

Specimen sent by Roberge to Berkeley, and now in Herb. Kew., examined; also specimen in Desm., Cr. Fr., ed. i. n. 1158.

Readily distinguished from *C. coronata* by the broadly triangular teeth, which are formed of rather stout, septate, more or less clavate hyphae.

**Cyathicula peristomalis.** Sacc., Syll., viii. n. 1284.

Ascophores subcylindrical, base somewhat narrowed, solid, glabrous except the margin, which is surrounded by 10-18 spreading, white, acuminate teeth, 25-35 long, by 8-10  $\mu$  broad at the base; whitish, disc plane, about  $\frac{1}{2}$  mm. high by  $\frac{1}{4}$  mm. broad; hypothecium and excipulum composed of aseptate, hyaline hyphae very intricately interwoven, the cortex is similar, and the hyphae run out to form the marginal teeth; asci fusoid, apex narrowed, widest portion sometimes

above, sometimes below the middle, almost sessile, base stout, 8-spored; spores obliquely 2-seriate, smooth, hyaline, narrowly elliptical, ends rather acute, at first multi-guttulate, then very distinctly 3-septate,  $24-27 \times 4-5$ ; paraphyses absent?

*Peziza (Mollisia) peristomalis*, B. & Br., Ann. Nat. Hist., n. 1169, ser. iii., vol. xviii. p. 12, pl. v. fig. 32.

*Mollisia peristomalis*, Phil., Brit. Disc., p. 201, pl. vi. p. 37.  
On dead bark of holly.

Type specimen examined.

A most exquisite object under a moderate magnifier, resembling some *Actinia* in miniature (B. & Br.).

Gregarious, subglobose and closed at first, then becoming elongated and more or less cylindrical, the base often slightly narrowed, but constantly sessile, apex truncate; disc not depressed, surrounded by acute teeth resembling the peristome of a moss. Allied to *Belonidium* in the 3-septate spores, but the sum of characters point to the present genus.

### CIBORIA. Fuckel.

Ascophore supported on a long, slender, often more or less flexuous stem, usually some tint of brown, margin entire; glabrous; hypothecium tinged brown, and along with the excipulum, formed of densely interlacing hyphae; asci narrowly cylindrical, elongated, 8-spored; spores 1-seriate, hyaline, continuous, or septate, elliptical; paraphyses present.

*Ciboria*, Fuckel, Symb. Myc., p. 311; Sacc., Syll., viii. p. 201 both in part only).

*Hymenoscypha*, Phil., Brit. Disc.

Closely allied to *Sclerotinia*, and differing mainly in not springing from a sclerotium. Also closely related to *Helotium*, but separated by the longer stem, brownish hypothecium, and larger size of the entire fungus.

#### *Ciboria ochroleuca*. Mass.

Scattered or gregarious, stipitate, pliant and leathery when fresh, hard when dry, at first subglobose and closed, then funnel-shaped, finally expanding, glabrous, often wrinkled from base to margin on the outside, especially when

dry, reddish brown or yellow-brown, 2 mm. to 1 cm. across, stem 1-3 cm. high, usually straight, rather slender, blackish brown; hypothecium brown, and like the hyaline excipulum formed of sparsely septate, branched, intricately interwoven hyphae, cortex parenchymatous, cells brown; asci narrowly cylindric-clavate, 8-spored; spores 1-seriate, or imperfectly 2-seriate above, hyaline, smooth, narrowly elliptical, ends rather pointed, straight or slightly curved, at first continuous and with several large oil-globules, then 1-many-septate,  $15-20 \times 5-6 \mu$ ; paraphyses slender, slightly thickened and often brownish at the tip.

*Peziza ochroleuca*, Bolton, Hist. Fung. Halifax, p. 105; pl. 105 (1789).

*Peziza firma*, Pers., Syn. Fung., p. 658 (1801).

*Hymenoscypha firma*, Phil., Brit. Disc., p. 123.

*Ciboria firma*, Sacc., Syll., viii. n. 829.

On decaying oak branches.

Specimen in Herb. Berk., Kew, examined.

Bolton's name—quoted by Persoon—is restored, as there is no mistaking his excellent figure and description.

***Ciboria luteovirescens*.** Sacc., Syll., viii. n. 838.

Gregarious or scattered, stipitate, closed at first then becoming plane or slightly convex, often with a more or less distinct central dimple, thin, pliant, glabrous, margin entire, every part pale, dingy, yellowish green,  $1-1\frac{1}{2}$  cm. across; hypothecium tinged with brown; cortical cells mostly hexagonal, elongated in the direction from base to margin; stem  $\frac{1}{2}-1\frac{1}{2}$  cm. long, slender, wavy, glabrous, slightly, narrowed downwards; asci cylindric-clavate, pedicel elongated, narrowed, 8-spored; spores obliquely 1-seriate, smooth, hyaline, continuous, elliptical, ends rather blunt,  $13-15 \times 5-6 \mu$ ; paraphyses hyaline, septate, slightly thickened towards the tip.

*Peziza luteovirescens*, Roberge, in Desm., Crypt. Fl. Fr., exs., ed. i., n. 1541.

*Hymenoscypha luteovirescens*, Phil., Brit. Disc., p. 121.

*Peziza pallidovirescens*, Phil., Grev. vi. p. 24.

On decaying and partly buried leaf-stalks of maple, sycamore, and lime.

Specimen from Roberge, now in Herb. Berk., Kew, exa-



mined; also, Desm., Cr. Fr., ser. i., n. 1541 (collected by Roberge), and Elv. Brit., n. 122.

**Ciboria ochracea.** Mass.

Scattered, at first top-shaped and closed, then funnel-shaped, finally plane or the often irregular margin more or less drooping, thin and rather tough, 2-4 mm. across, glabrous, every part ochraceous; stem 4-8 mm. long,  $\frac{1}{2}$ - $\frac{3}{4}$  mm. thick, thinner towards the base, glabrous; hypothecium and excipulum formed of interwoven, slender hyphae, passing into a small-celled, parenchymatous cortex; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, very narrowly cylindric-fusiform, ends rather acute, often slightly curved,  $8-10 \times 1.5 \mu$ ; paraphyses slender, hyaline, very slightly thickened at the tip.

*Helotium tuba*, Fr., *b. ochracea*, B. & Br., Ann. Nat. Hist., n. 1486, ser. iv., vol. xv. p. 38 (1875); Phil., Brit. Disc., p. 126.

On a heap of decaying vegetation.

The present species is a typical *Ciboria*, and cannot be allowed to stand as the variety of a species, the type of which is itself practically unknown.

Type specimen examined.

**Ciboria echinophila.** Sacc., Fung. Ven., ser. iv., n. 89; Sacc., Syll., viii. n. 824.

Scattered, stipitate, subglobose and closed at first, then funnel-shaped, at length almost or quite plane, rather fleshy, glabrous, pale cinnamon or brownish, 2-5 mm. across; stem about 1 cm. long, slender, often wavy, pale, minutely downy at first, becoming smooth; hypothecium tinged brown, and with the hyaline excipulum formed of interlacing hyphae, cortex parenchymatous, cells brown; asci cylindric-clavate, 8-spored; spores 1-seriate or with a tendency to become 2-seriate near the tip of the ascus, hyaline, subcylindrical or sausage-shaped, rather strongly curved, ends obtuse, 3-4-guttulate, then more or less completely multiseptate  $16-21 \times 5 \mu$ ; paraphyses slender, tip slightly thickened.

*Peziza echinophila*, Bull., Champ. Fr., p. 235, tab. 500, fig. 1.

*Hymenoscypha echinophila*, Phil., Brit. Disc., p. 122.



On fallen, decaying involucre of sweet chestnut.

The spores, as in *C. ochroleuca* and other species, are often furnished with delicate protoplasmic threads at the ends, and these sometimes terminate in a minute, globose head. Allied to *C. firma*, but distinguished by the strongly curved spores, and by the different habitat.

Specimens examined in Cooke's Fung. Brit., ed. ii., n. 367; Phil., Elv. Brit., n. 32, and Rehm, Ascom. n. 606.

**Ciboria subularis.** Sacc., Syll., viii. n. 828.

Ascophore stipitate, subglobose and closed, then becoming saucer-shaped or nearly plain, thin, fragile, glabrous, margin entire; disc brown, depth of colour variable, externally paler, 2-5 mm. across; stem slender, wavy, coloured like the pileus, 1-1.5 cm. long; hypothecium brownish, and like the hyaline excipulum formed of intricately interlacing hyphae, cortex parenchymatous, cells brown; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores obliquely 1-seriate, or partly 2-seriate near the top of the ascus, hyaline, smooth, continuous, straight, sometimes 2-guttulate, narrowly elliptic-oblong,  $14-21 \times 4-5 \mu$ ; paraphyses slender, very slightly thickened at the tips.

*Peziza subularis*, Bull., Champ. Fr., p. 236, tab. 500, fig. 2.

*Hymenoscypha subularis*, Phil., Brit. Disc., p. 122.

On falling, decaying fruits of *Angelica*, also on decaying seeds of *Helianthus*, *Bidens*, &c.,

Distinguished from *C. ochroleuca* by the smaller size of the ascophore, very slender stem, continuous spores, and different habitat.

Specimen in Herb. Berk., Kew, accepted as typical.

**Ciboria amentacea.** Fekl., Symb. Myc., p. 311; Rehm, Krypt.-Flora, Disc., p. 755; Sacc., Syll., viii. n. 822.

Gregarious, stipitate, at first closed and pear-shaped, then expanding until almost plane, thin, rather pliant; disc pale brown, externally paler, 3-10 mm. broad; stem 1-4 cm. long, up to  $\frac{1}{2}$  mm. thick, often wavy; hypothecium brown, and along with the hyaline excipulum, composed of stout, intricately interwoven hyphae, cortical cells parenchymatous,  $14-20 \mu$  diameter; asci cylindrical, apex rounded, 8-spored, spores obliquely 1-seriate, hyaline, continuous,

smooth, broadly elliptical,  $9-11 \times 5-6 \mu$ ; paraphyses slender, slightly clavate at the tip, hyaline.

*Hymenoscypha amentacea*, Phil., Brit. Disc., p. 120.

On fallen male catkins of willow and alder. Spring.

Closely allied to *C. caucus*, but distinguished by the elongated, slender stem, paler disc, larger cortical cells, and clavate paraphyses.

Specimens examined in Phil., Elv. Brit., n. 116, and Fuckel's Fung. Rhen., n. 1178.]

Phillips says the margin of the ascophore is tomentose, the hair-like cells of the margin being  $50 \times 18 \mu$ , and continuous.

**Ciboria caucus.** Fekl., Symb. Myc., p. 311; Rehm, Krypt.-Flora, Disc., p. 756; Sacc., Syll., viii. n. 823.

Scattered, piriform and closed at first, then wine-glass shaped and margin erect or incurved, finally expanding, thin, umber-brown, externally paler at first, then brown, glabrous, 2-8 mm. across; stem 2-10 mm. long, about  $\frac{1}{2}$  mm. thick, often wavy; hypothecium brown, and like the hyaline excipulum, formed of very much interwoven hyphae, cortical cells brown, irregularly polygonal, 8-10  $\mu$  diameter; asci cylindric-clavate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, smooth, elliptical, sometimes slightly bent,  $9-10 \times 5-6 \mu$ ; paraphyses slender, hyaline, tips not thickened.

*Hymenoscypha caucus*, Phil., Brit. Disc., p. 120.

On fallen male cones of poplar. Spring.

**Ciboria pseudotuberosa.** Sacc., Syll., viii. n. 820.

Gregarious, on fallen, decaying acorns, stipitate, at first clavate or turbinate and closed, then expanding until almost plane, often with a central dimple, thin, pliant, glabrous, entirely brownish, often with an olive tinge  $\frac{1}{2}$ -1 cm. across, minutely wrinkled externally; hypothecium dark brown, and like the pale epithecium consisting of interwoven hyphae 5-7  $\mu$  thick, cortex parenchymatous; stem 1-2 cm. long, slender, slightly tapering downwards, wavy, smooth; asci cylindrical, pedicel narrowed, slender, 8-spored; spores obliquely 1-seriate, smooth, hyaline, continuous, broadly elliptical or egg-shaped, ends blunt,  $8-10 \times 5-6 \mu$ ; paraphyses

slender, hyaline, septate, about  $2.5\ \mu$  thick at the tip, sometimes branched.

*Sclerotinia pseudotuberosa*, Rehm, Krypt.-Fl., Disc., p. 803, figs. 1-5, p. 800.

*Hymenoscypha pseudotuberosa*, Phil., Brit. Disc., p. 119, pl. 5, fig. 25.

On fallen, decayed acorns.

Specimen examined in Rehm's Ascom., n. 106 A, B.

## SCLEROTINIA. Fuckel.

Ascophores solitary or gregarious, springing from a sclerotium, stipitate, at first minute and closed, gradually growing and expanding, until finally almost or quite plane, glabrous, brown; hypothecium and excipulum formed of intricately webbed hyphae; asci elongated, narrowly cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous; paraphyses present, slender.

*Sclerotinia*, Fuckel, Symb. Myc., p. 330; Sacc., Syll., viii. n. 195.

*Hymenoscypha*, Phillips, Brit. Disc.

*Peziza*, of many authors.

Closely allied to *Ciboria*, differing more especially in growing from a sclerotium. In some species a conidial condition is known, belonging to the form-genus *Botrytis*.

### \* *Growing on Dicotyledons.*

*Sclerotinia tuberosa*. Fekl., Symb. Myc., p. 331; Rehm, Krypt.-Flora, Disc., p. 814, figs. 1-5, p. 802; Sacc., Syll., viii. n. 797.

Ascophores 2-6 springing from an irregularly elliptical or subglobose sclerotium up to  $3 \times 1.5$  cm., buried in the ground, externally black, inside white; ascophore at first pear-shaped and closed, then funnel-shaped, finally becoming almost plane, bright brown, edge entire, thin, 1-3 cm. across; hypothecium and excipulum, consisting of pale brown, sparsely septate, branched, intricately interwoven hyphae, cortex similar in structure, darker brown; stem 2-7 cm. long, 1.5-3 mm. thick, often flexuous, brown; asci cylindri-

cal, apex blunt, pedicel elongated, tapering, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, ends obtuse, often 2-guttulate,  $15-18 \times 6-7 \mu$ ; paraphyses hyaline, septate, slightly thickened upwards.

*Octospora tuberosa*, Hedwig, Musc. Frond., ii. p. 33, t. x. fig. B.

*Hymenoscypha tuberosa*, Phil., Brit. Disc., p. 113.

In woods.

The sclerotium is attached to the rhizome of *Anemone nemorosa*.

According to Tulasne—Ann. Sci. Nat., ser. iii., vol. xx. p. 175, and Sel., Fung. Carpol., vol. iii. t. 22, figs. 6 and 7—the spores germinate readily when placed in a nutrient solution, and produce either one or more germ-tubes, which bear minute, globose conidia at the tips of short, conical branches, or sometimes the conidia are produced without the intervention of hyphae, at the ends of the spores in small groups. The spores usually become septate, and change in form during germination.

Specimens examined in Cooke, Fung. Brit., n. 558; Rehm, Asc., n. 202; and Berk., Brit. Fung., n. 153.

### **Sclerotinia sclerotiorum. Mass.**

Solitary or 2-4, springing from a black, usually elongated sclerotium, 1-2 cm. long; ascophore at first small and closed, then funnel-shaped, finally plane or slightly convex, margin entire, glabrous, thin, rather firm, pale brown, 3-7 mm. broad; stem slender, often more or less wavy, smooth, pale brown, 1-3 cm. long; hypothecium and excipulum formed of slender, interwoven hyphae; asci narrowly cylindrical, elongated, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, sometimes slightly oblique, usually 2-guttulate,  $9-13 \times 4-6 \mu$ ; paraphyses slender, very slightly thickened upwards.

*Peziza sclerotiorum*, Libert, Crypt. Ard., n. 326.

*Sclerotinia libertiana*, Fuckel, Symb. Myc., p. 331; Rehm, Krypt.-Flora, Disc., p. 816; Sacc., Syll., viii. n. 798.

*Hymenoscypha sclerotiorum*, Phil., Brit. Disc., p. 115.

*Peziza postuma*, Berk. & Wils., Gard. Chron., Sept. 1883.

Growing from sclerotia formed in the stems of potato, cabbage, beet, &c.

Specimens examined in Madame Libert's Crypt. Ard., n. 326, also Berkeley's specimens of *P. postuma*.

**Sclerotinia Candolleana.** Fekl., Symb. Myc., p. 330; Rehm, Krypt.-Flora, Disc., p. 810; Sacc., Syll., viii. n. p. 807.

Ascophores 1-4 springing from a small, externally black sclerotium 3-4 mm. across; ascophore thin, glabrous, closed at first, soon plane, reddish or yellowish brown, 1-6 mm. broad; excipulum and hypothecium formed of interwoven hyphae; stem very slender, 5-10 mm. long, straight or crooked, deep red-brown, sometimes with white down at the base; asci narrowly cylindrical, 8-spored; spores 1-seriate, hyaline, smooth, continuous, elliptical, ends obtuse,  $7-9 \times 3-4 \mu$ ; paraphyses slender, slightly thickened upwards.

*Peziza De Candolleana*, Lév., Ann. Sci. Nat., ser. ii., vol. xx. p. 223, pl. 7, fig. 4 (1843).

*Hymenoscypha Candolleana*, Phil., Brit. Disc., p. 114.

On fallen leaves of sweet chestnut and oak.

Specimen in Fuckel, Fung. Rhen., n. 2915, examined.

**Sclerotinia filipes.** Sacc., Syll., viii. n. 806.

Thin, fragile, concave, becoming plane, at length convex, glabrous, white; stem long, filiform, flexuous, same colour, arising from a black, subglobose sclerotium; spores 8, oblong-fusiform,  $8 \times 1 \mu$ ; paraphyses slenderly filiform.

*Hymenoscypha filipes*, Phil., Brit. Disc., p. 116.

Growing from a wrinkled, black, nearly globose sclerotium amongst vegetable fragments in a damp situation.

Cup about  $1\frac{1}{2}$  lines broad; stem  $7\frac{1}{2}$  lines long. This is much smaller than *P. Candolleana*, and the spores are altogether different. *Phialea capillipes* (Quélet) is grey-bistre colour, and grows from a fusiform sclerotium, otherwise there is a very near resemblance.

Unknown to me. The above description copied entirely from Phillips, Brit. Disc., p. 116.

**Sclerotinia fructigena.** Rehm, Krypt.-Flor. Disc. p. 67.

Sclerotium up to 3 mm. thick, black, wrinkled, mostly concentrically arranged.

Ascophore unknown.

Conidia of two kinds:—

I. Conidia globose, 3-4  $\mu$  diameter, borne on short, flask-shaped branches of young mycelium.

II. (*Monilia fructigena*.) Forming dense, tomentose tufts, often growing in circles and becoming confluent, white, then dingy ochraceous red, hyphae branched; conidia elliptical or lemon-shaped, 19-26  $\times$  10-12  $\mu$ , produced in simple or usually branched chains, colourless at first, then tinged with dull red.

*Sclerotium pyrinum*, Persoon.

*Monilia fructigena*, Pers., Syn., p. 63; Sacc., Syll., iv. n. 157; Mass., Fung.-Fl., iii. p. 283.

All the above forms occur on the fruit of apple and pear trees, less frequently on the leaves.

\* \* *Growing on Monocotyledons.*

**Sclerotinia Curreyana.** Karst., Rev. Mon., p. 123; Rehm, Krypt.-Flora, Disc., p. 821, figs. 1-5, p. 803; Sacc., Syll., viii. n. 809.

Ascophores 1-13, springing from a small, irregularly elliptical sclerotium, 3-5  $\times$  1-2 mm., black outside, inside white; ascophore subglobose and closed at first, gradually expanding until nearly or quite plane, thin, bright brown, glabrous, edge even, disc often more or less wrinkled, 2-5 mm. across; stem slender, often crooked, 3-7 mm. long, sometimes downy at the base; hypothecium and excipulum pale brown, formed of intricately interwoven hyphae, which pass into brown parenchymatous cells at the cortex; asci narrowly cylindric-clavate, 8-spored; spores 1-seriate, hyaline, continuous, straight or slightly curved, narrowly cylindrical, ends obtuse, 8-14  $\times$  2-3  $\mu$ ; paraphyses slender, pale brown at the slightly thickened apex.

*Peziza Curreyana*, Berk., Trans. Linn. Soc., xxiv. p. 495 (1865).

*Hymenoscypha Curreyana*, Phil., Brit. Disc., p. 116.

*Sclerotium roseum*, Fries, Elench. Fung., ii. p. 43 (the sclerotium of the present species).

On fading or dead culms of various species of *Juncus*.

The cup was of a bright brown colour, varying somewhat in shape; in most it was hemispherical, in some infundi-



buliform. In one the edge of the cup was erect, extending beyond the equator of the hemisphere; in others the edge of the cup was recurved and sinuous. The number growing from one sclerotium varied from 2 to 13, and the greater the number, the less was the size of the individual. The diameter of the largest cup was rather more than one-half, and of the smallest about  $\frac{1}{16}$  of an inch. The stalk was well developed, being generally about the length of the diameter of the cup, of a darker colour, and tapering somewhat from above downwards. In one specimen the base of the stem at its point of junction with the sclerotium was thickly covered with hairs. (Currey.)

Type specimen examined; also specimens in Phil., Elvell. Brit., n. 31.

*Sclerotinia Duriaeana*. Quélet, Bull. Soc. Myc., i. p. 115; Rehm., Krypt.-Flora, Disc., p. 820; Sacc., Syll., viii. n. 810.

Ascophores 1-3, springing from a small, internally white, externally black, elongated sclerotium 6-15  $\times$  2 mm.; ascophore closed at first, expanding until nearly or quite plane, thin, fragile, glabrous, pale brown, 2-6 mm. broad; excipulum and hypothecium brownish, formed of thin, interwoven hyphae; stem cylindrical, firm, straight or slightly wavy, brown, base darker and often downy, 1-2 cm. long; asci narrowly cylindrical, elongated, 8-spored; spores 1-seriate, elliptical, ends blunt, straight or very slightly bent, hyaline, continuous, 10-15  $\times$  6-8  $\mu$ ; paraphyses slender, septate, thickened upwards.

*Peziza Duriaeana*, Tul., Sel. Fung. Carp., i. p. 103, and iii. p. 203, pl. xxii. figs. 20-24.

*Hymenoscypha Duriaeana*, Phil. Brit. Disc. p. 115.

In culms of *Carex arenaria*, and *C. stricta*.

*Conidial stage*. Forming slightly effused, somewhat waxy patches; conidia hyaline, continuous, subglobose, 1.5-2  $\mu$  diameter.

*Epidochium arabicus*, Desmaz., xxii. Not. in Ann. Sci. Nat., p. 19.

*Sphacelia ambiens*, Sacc., Michelia, ii. p. 131.

On culms of *Carex arenaria* and *C. stricta*.

Specimen examined in Rehm's Ascom., n. 603.



**Sclerotinia bulborum.** Rehm, Krypt.-Flora, Disc., p. 819; Sacc., Syll., viii. n. 802; Mass., in Gard. Chron., Aug. 11th, 1894, p. 1894, with fig.

Ascophores 1-3 in number, springing from an irregular sclerotium which is at first white, then blackish externally,

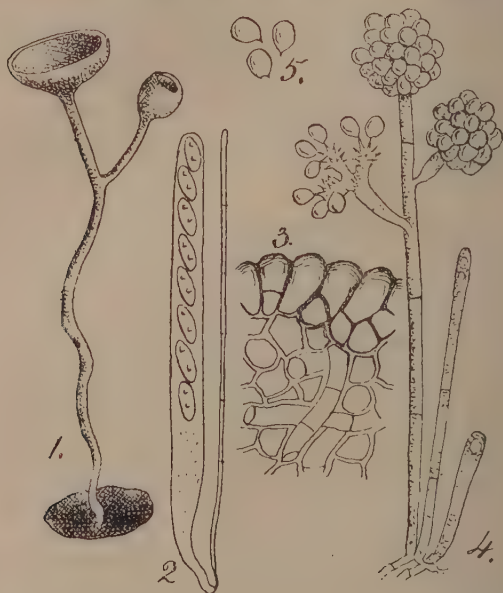


Fig. 1, *Sclerotinia bulborum*, Rehm,  $\times 10$ ;—Fig. 2, ascus and paraphysis of same,  $\times 400$ ;—Fig. 3, section of portion of a sclerotium,  $\times 400$ ;—Fig. 4, *Botrytis* form of the fungus,  $\times 250$ ;—Fig. 5, conidia of *Botrytis* stage,  $\times 400$ .

8-12 mm. diameter; ascophore stipitate, at first closed, then hemispherical, or sometimes more expanded, brown, glabrous,  $3-5\ \mu$ ; stem slender, almost cylindrical, smooth, brown, 10-15 mm. long; excipulum and hypothecium formed of slender, interwoven hyphae; asci narrowly cylindrical,

elongated, 8-spored, spores 1-seriate, hyaline, continuous, 2-guttulate, elliptical, apex sometimes most obtuse,  $14-16 \times 7-8 \mu$ ; paraphyses slender, hyaline.

*Peziza bulborum*, Wakker, Bot. Central., viii. p. 309.

*Botrytis form.* Compact brownish-buff tufts, tips of fertile branchlets spinulose, each spine bearing a smooth, hyaline, elliptical, apiculate conidium,  $9-10 \times 7 \mu$ .

On bulbs of *Hyacinthus*, *Scilla*, *Crocus*, and *Allium*.

### *Excluded species.*

**Sclerotinia trifoliorum.** Eriks. On Klöfv.

*Hymenoscypha ciborioides*, Phil., Brit. Disc., p. 117.

There is no evidence of the above-named species having occurred in Britain.

### CHLOROSPLENium. Fries. (figs. 41-42, p. 156.)

Ascophore stipitate or almost sessile, tough and pliant, at first closed, then expanded, glabrous, verdigris-green or dingy olive, margin usually irregular and wavy; hypothecium and excipulum formed of interwoven hyphae; asci narrowly cylindric-clavate, 8-spored; spores hyaline, continuous or septate, elongated, irregularly 2-seriate; paraphyses present.

*Chlorosplenium*, Fries, Summa Veg. Scand., p. 356; Phil., Brit. Disc., p. 146; Sacc., Syll., viii. p. 315.

*Peziza*, of various authors.

Distinguished by the tough substance and green or olive colour of the ascophore. Some species impart a deep verdigris-green colour to the wood on which they grow.

*Coryne* somewhat resembles the present genus, but differs in the texture of the ascophore being more or less gelatinous.

**Chlorosplenium aeruginosum.** De Not., Prop. Rett. Discom., p. 22; Rehm, Krypt.-Flora, Disc., p. 753 figs. 1-5, p. 749; Phil., Brit. Disc., p. 147, pl. 5, f. 28; Sacc., Syll., viii. n. 1311. (figs. 41-42, p. 156.)

Gregarious or scattered, staining the wood on which they grow deep verdigris green; ascophore at first turbinate and closed, then expanding, the margin usually wavy and more or less irregular, flexible, glabrous, even, somewhat contracted and minutely wrinkled when dry, every part deep verdigris-green, the disc often becoming paler and with a tinge of tan colour, 1-4 mm. across; stem 1-3 mm. long, expanding into the ascophore; hypothecium and excipulum formed of interlaced, hyaline hyphae 3-4  $\mu$  thick, these become stouter and coloured green in the cortex; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored: spores irregularly 2-seriate, hyaline or with a very slight tinge of green, very narrowly cylindric-fusiform, straight or curved, 10-14  $\times$  2.5-3.5  $\mu$ , 2-guttulate, or with several minute green oil globules; paraphyses slender, with a tinge of green at the tip.

*Helvella aeruginea*, Oed., Fl. Dan., tab. 356, fig. 2.

*Helotium aeruginosum*, Fr., Summa Veg. Scand., p. 353.

On fallen branches of oak, ash, and hazel. Rehm says that it also occurs on *Pinus abies* and *Alnus*; Saccardo adds birch.

Specimens examined in Cooke, Fung. Brit., ed. ii., n. 389; Phill., Elv. Brit., n. 86, and Rehm, Ascom., n. 409.

On fallen oak branches, staining the wood on which it grows, for a considerable depth, of a deep verdigris-green, the wood so stained being employed as "green oak" in the manufacture of Tunbridge ware. The fully developed cups are much more rare than the green myceloid state. (Phil.)

### **Chlorosplenium discoideum. Mass.**

Gregarious, very shortly stipitate, subglobose and closed at first, soon plane or very slightly convex, with a distinct, narrow, slightly raised, entire margin; disc circular in outline, clove-brown, or with a suggestion of red, margin and glabrous exterior deep verdigris-green,  $\frac{1}{2}$ -3 mm. across; hypothecium and excipulum formed of slender, densely interwoven hyphae; asci narrowly cylindric-clavate, apex somewhat narrowed, pedicel slender, 8-spored; spores with a slight tendency to become 2-seriate near the apex of the ascus, 1-seriate below, hyaline, narrowly elliptical, ends rather acute, often slightly curved, at first 2-guttulate,

then 1-septate; paraphyses slender, hyaline, very slightly thickened upwards.

On decorticated wood.

The first knowledge of this species was obtained from specimens received from New Zealand, shortly after which it was found growing on an old *Robinia* trunk in Kew Gardens. Known from all other species by the constantly regular, discoid apothecium, the brown disc, and the 1-septate spores with acute ends. The wood on which the fungus grows is stained verdigris-green, as in *C. aeruginosum*.

**Chlorosplenium versiforme.** Karst., Myc. Fenn., i. p. 102; Phil., Brit. Disc., p. 146; Sacc., Syll., viii. n. 1315.

Scattered, shortly stipitate or only narrowed below into a short, stem-like base; closed at first, gradually expanding, usually more or less irregular and wavy, glabrous; disc yellowish olive or dingy green, externally purplish brown, minutely wrinkled, 1-3 cm. across, tough; hypothecium and excipulum brown, formed entirely of closely interwoven hyphae, 3-4  $\mu$  thick; asci narrowly cylindric-clavate, tips slightly narrowed, 8-spored; spores irregularly 2-seriate, or sometimes almost 1-seriate, hyaline, 2-4-guttulate, cylindrical, ends blunt, straight or usually slightly bent, continuous at first, then 1-septate, 9-12  $\times$  3.5-4  $\mu$ ; paraphyses slender, about 2  $\mu$  thick at the yellowish brown tips.

*Peziza versiformis*, Pers., Icon. et Descr. Fung., p. 25, t. 7, fig. 7.

*Coryne versiformis*, Rehm, Krypt.-Flora, Disc., p. 492.

On fallen fir-trunks, also on scales of fir-cones, and Phillips says on ash-stumps.

Distinguished from *C. aeruginosum* by the purplish exterior of the ascophore, larger 1-septate spores, and by not staining the wood on which it grows, green.

Specimen in Berk., Brit. Fung., n. 274, examined.

**Chlorosplenium elatinum.** Mass.

Ascophore stipitate, turbinate, at first closed, then expanding, but the margin persistently strongly incurved when dry, glabrous, somewhat shining, dingy blackish-olive, 2-5 mm. across; stem blackish, 2-3 mm. long; hypothecium and excipulum composed entirely of aseptate, hyaline, branched, intricately interwoven hyphae, which

become tinged with olive at the cortex, are often constricted like a string of sausages, and have the walls furnished with delicate thickened bands; asci cylindric-clavate, apex somewhat narrowed and thick-walled, 8-spored; spores irregularly 2-seriate above, 1-seriate below, elliptical, ends obtuse, straight or slightly curved, continuous, hyaline, often guttulate,  $14-18 \times 5-7 \mu$ ; paraphyses slender, slightly thickened and coloured at the tip.

*Ombrophila Kriegeriana*, Rabenh., Hedw., 1878, p. 31.

*Chlorosplenium Kriegerianum*, Sacc., Syll., viii. n. 1320.

*Rutstroemia elatina*, Rehm, Krypt.-Flora, Disc., p. 767, figs. 1-5, p. 751.

*Peziza elatina*, A. & S., Consp., p. 330, t. ii. f. 3.

On small, fallen branches of *Abies pectinata*, &c.

Specimens examined in Rab., Fung. Eur., n. 2315 A, and Rehm, Ascom., n. 660.

## VESTITAE.

### A. *Spores globose.*

**Pitya.** Growing on conifers.

**Sphaerospora.** Growing on the ground.

B. *Spores elongated; ascophores gregarious on a spreading subiculum; or base of ascophore densely strigose.*

**Tapesia.** Ascophores minute, gregarious on an effused subiculum. Growing on wood.

**Plectania.** Ascophores large, furnished at the base with coarse, black hyphae. Growing on branches and wood.

C. *Spores elongated, 3—many-septate; ascophores not seated on a subiculum, nor strigose at the base.*

**Erinella.** Paraphyses lanceolate. Growing on plants.

**Echinella.** Paraphyses cylindrical. Growing on plants.

**Diplocarpa.** Paraphyses cylindrical, bearing conidia at the tips. Growing on the ground.

*D. Spores elongated, continuous: external hairs—especially the marginal ones—thick-walled, septate, pointed and coloured.*

**Lachnea.** Paraphyses clavate at the tip. Growing on the ground, rarely on wood.

**Desmazierella.** Tips of paraphyses black and pointed, projecting above the surface of the disc. Growing on pine leaves.

*E. Spores elongated, continuous—sometimes 1-septate in Dasyscypha—external and marginal hairs thin-walled, cylindrical, sometimes very short and delicate.*

**Dasyscypha.** Ascophore minute. Growing on wood, herbaceous stems, and leaves.

**Neottiella.** Ascophore small. Growing on the ground.

**Geopyxis.** Ascophore large, stipitate. Growing on the ground, rarely on branches or wood.

**Sepultaria.** Ascophore large, sessile. Growing on the ground, at first subterranean, then becoming partly exposed.

## PITYA. Fuckel.

Ascophore narrowed into a short, stout, stem-like base, piriform and closed at first, then becoming almost or quite plane; margin entire, glabrous, lower portion of ascophore and stem minutely villose, rather fleshy; cortex parenchymatous, cells irregularly polygonal; asci cylindrical, apex obtuse, narrowed below into a very long pedicel, 8-spored; spores globose, continuous, hyaline, 1-seriate; paraphyses present.

*Pitya*, Fuckel, Symb. Myc., p. 317 (written *Pithya*, and





corrected to *Pitya* by Saccardo, Syll., viii. p. 209); Sacc., Syll., viii. p. 209; Rehm., Krypt.-Flora, Disc., p. 925.

Distinguished from other genera having globose, hyaline spores, by growing on conifers.

*Pitya cupressi*. Rehm, Krypt.-Flora, Disc., p. 926; Sacc., Syll., viii. n. 849.

Gregarious, sessile or narrowed into a short, stem-like base, piriform and closed when young, then nearly plane, somewhat fleshy; margin entire, thickish, glabrous, lower portion of ascophore and stem downy, especially when young, whitish; disc orange-yellow or yellow; 1–2.5 mm. across; hypothecium and excipulum parenchymatous, cortical cells largest, polygonal,  $8-11 \times 6-7 \mu$ ; asci cylindrical, apex rounded, tapering below into a long pedicel, 8-spored; spores globose, hyaline, smooth, with a large central oil-globule,  $10-12 \mu$  diameter, 1-seriate in the upper part of the

#### ILLUSTRATIONS OF THE PEZIZAE, &c.

Fig. 1, *Barlaea Crouanii*, Sacc., nat. size;—Fig. 2, section of same,  $\times$ ;—Fig. 3, spore of same,  $\times 300$ ;—Fig. 4, ascus and paraphyses of same, highly  $\times$ ;—Fig. 5, *Lachnea hemispherica*, Gillet, specimen in early stage, nat. size;—Fig. 6, section of excipulum, showing the external hairs in tufts,  $\times$ ;—Fig. 7, two of the marginal hairs,  $\times 300$ ;—Fig. 8, spores of same in young and mature stage,  $\times 300$ ;—Fig. 9, section of same when mature and expanded;—Fig. 10, *Helotium lechithinum*, Mass., nat. size;—Fig. 11, section of same,  $\times$ ;—Fig. 12, section of excipulum of same,  $\times$ ;—Fig. 13, ascus and paraphysis of same, highly  $\times$ ;—Fig. 15, *Acetabula vulgaris*, Fekl., small and young plant, nat. size;—Fig. 16, spore of same,  $\times 300$ ;—Fig. 17, *Otidea neglecta*, Mass., young and only partly expanded plant, nat. size;—Fig. 18, portion of excipulum of same, showing the outside clavate cells,  $\times 300$ ;—Fig. 19, spore of same,  $\times 300$ ;—Fig. 20, *Lachnea scutellata*, Gill., nat. size;—Fig. 21, section of same, slightly  $\times$ ;—Fig. 22, *Peziza vesiculosa*, Bull., small specimen, nat. size;—Fig. 23, ascus and paraphysis of same,  $\times 250$ ;—Fig. 24, *Geopyxis coccinea*, Mass., nat. size;—Fig. 25, spores of same,  $\times 300$ ;—Fig. 26, *Geopyxis rapulum*, Sacc., nat. size;—Fig. 27, spores of same,  $\times 300$ ;—Fig. 28, *Mollisiella iliciacola*, Mass., nat. size;—Fig. 29, the same,  $\times$ ;—Fig. 30, ascus and paraphyses,  $\times 300$ ;—Fig. 31, *Helotium epiphyllum*, ascus and paraphyses,  $\times 300$ ;—Fig. 32, specimens of same on portion of dead oak leaf, nat. size;—Fig. 33, *Neottiella corallina*, Mass., nat. size;—Fig. 34, the same,  $\times$ ;—Fig. 35, spore of same,  $\times 300$ ;—Fig. 36, *Helotium moniliferum*, Mass., a single ascophore, slightly  $\times$ ;—Fig. 37, section of excipulum of same  $\times$ ;—Fig. 38, ascus and paraphyses of same,  $\times 300$ ;—Fig. 39, conidia of same,  $\times 300$ ;—Fig. 40, *Plectanidium melastoma*, Fekl., section of ascophore, nat. size.

ascus; paraphyses slender, septate, hyaline, not more than  $3\ \mu$  thick at the slightly swollen apex.

*Peziza cupressi*, Batsch, Elench. Fung., p. 119.

*Lachnella cupressi*, Phil., Brit. Disc., p. 241, pl. viii., fig. 45.

On dry, fallen twigs and leaves of *Cypress* and *Juniper*.

Specimen in Desm., Crypt. Fr., ed. ii., n. 19, examined.

### SPHAEROSPORA. Sacc.

Ascophore rather fleshy, sessile, margin incurved and closed at first, soon expanding and becoming almost or quite plane; disc often brightly coloured; externally pilose, hairs coloured, those fringing the margin septate, thick-walled, pointed, and larger than the remainder; cortex parenchymatous, cells large; asci large, cylindrical, apex obtuse, 8-spored; spores 1-seriate, hyaline, continuous, globose, smooth or having the epispore warted or reticulated; paraphyses septate, clavate.

*Sphaerospora*, Sacc., Mich., i. p. 594; Sacc., Syll., viii. p. 188.

*Lachnea*, Phil., Brit. Disc.

*Peziza*, of many authors.

Allied to *Lachnea* in the structure of the ascophore and setulose margin, but differing in the perfectly globose spores.

*Barlaea* has globose spores, but the ascophore is glabrous.

Growing on the ground, rarely on rotten wood.

\* *Disc red or orange.*

***Sphaerospora trechispora.*** Sacc., Syll., viii. n. 763.

Scattered, sessile, subglobose and closed at first, soon plane and appanate, rather fleshy,  $\frac{1}{2}$ –1 cm. across; disc varying from orange-red to crimson, externally paler and clothed with stout, clear brown, septate, thick-walled, pointed hairs, the marginal ones  $200\text{--}300 \times 7\text{--}9\ \mu$ , base often more or less swollen and branched, mixed at the margin with short, obtuse, thin-walled, 1–2 septate hairs; cortical cells large; asci large cylindrical, apex obtuse, 8-spored; spores 1-seriate, hyaline, globose, increasing gradually up to  $18\text{--}20\ \mu$  diameter, epispore thick, smooth at

first, finally covered with a very small meshed network formed by anastomosing, raised ribs; paraphyses septate, apex clavate and filled with brownish or red granules.

*Peziza trechispora*, B. & Br., Ann. Nat. Hist., vol. xviii., p. 77 (1846); Mycogr., fig. 129 (spore wrong; represented as warted instead of being minutely reticulated.)

*Lachnea trechispora*, Phil., Brit. Disc., p. 218, pl. vii., fig. 41 (spores wrong; should be reticulated.)

On naked, damp earth, rarely on rotten wood.)

Closely allied to *S. asperior*, but easily recognised by the thick epispore being ornamented with a network of very delicate ridges. Seen in optical section the thin ridges resemble delicate, radiating spines in the thickness of the wall; hence, as in many other instances, the spore has been erroneously described as echinulate.

Type specimen examined; also specimen in Cooke, Fung. Brit., n. 288. *S. asperior* is confused with the present series in the herbaria of Berkeley and Broome; and may possibly have been sent to correspondents as *S. trechispora*.

***Sphaerospora asperior*. Sacc., Syll. viii. n. 764.**

Scattered, crimson to tawny red, sessile, closed at first, soon becoming plane, rather fleshy, 2–5 mm. across; externally clothed with brown, septate, thick-walled, pointed hairs, often more or less curved at the margin, and there measuring  $250\text{--}350 \times 8\text{--}10 \mu$ , base often branching; cortical cells large; asci large, cylindrical, tip obtuse, 8-spored: spores 1-seriate, globose, hyaline, smooth at first, then bristling with crowded, cylindrical, obtuse warts  $2\text{--}3 \mu$  long; clavate, and containing coloured granules when fresh.

*Peziza asperior*, Nyl., Pez. Fenn., p. 21; Cooke, Mycogr fig. 51; Phil., Brit. Disc., p. 85.

On naked, damp soil.

Specimens in Thum., Myc. Univ., n. 1211, and Rehm, Ascom., n. 405 (called *Humaria trechispora* (B. & B.).

Differs from *S. trechispora* in the distinctly warted, and not reticulated spores.

***Sphaerospora binominata*. Mass.**

Scattered, sessile, subglobose and closed at first, then becoming almost or quite plane, rather fleshy, 1–2 mm. across;

disorange-red, externally clothed with thick-walled, fusiform, acuminate, 1-3-septate, dark brown hairs, largest at the margin, where they measure  $80-150 \times 7-8 \mu$ ; cortex parenchymatous, cells irregularly polygonal,  $10-15 \mu$  diameter; asci stoutly cylindrical, apex obtuse, 8-spored; spores hyaline, globose, smooth at first then covered with a very delicate reticulation,  $16-18 \mu$  diameter, 1-seriate; paraphyses slender, septate; tips broadly clavate, and filled when fresh with red granules.

Growing on a patch of *Jungermannia turbinata*, Radd.

This very distinct and beautiful species was collected by Professor T. Johnson, near Bundoran, Ireland, 10/94.

Distinguished from allies by the small size of the ascophore, and the fusiform or ventricose, acuminate, marginal hairs.

\*\* *Disc brownish or fawn-colour.*

### **Sphaerospora hinnulea.** Mass.

Scattered, sessile, globose and closed at first, finally becoming almost plane, margin persistently more or less erect, often wavy, varying from fawn-colour to reddish brown; margin fringed with short, 1-2-septate, acute, crowded, pale brown hairs,  $40-60 \times 6-8 \mu$ , otherwise glabrous;  $\frac{1}{2}$ -1 cm. across; cortex parenchymatous, cells irregularly polygonal, slightly elongated in the direction from base to edge, and running out into the marginal hairs,  $15-20 \times 10-12 \mu$ ; asci cylindrical, apex obtuse, 8-spored; spores 1-seriate, hyaline, smooth globose,  $12-15 \mu$ ; paraphyses hyaline, septate, becoming clavate upwards.

*Peziza hinnulea*, B. & Br., n. 1320\*, in Ann. Nat. Hist., 1871, p. 16; Cooke, Mycogr., fig. 52.

*Lachnea hinnulea*, Phil., Brit. Disc., p. 219.

*Barlaea hinnulca*, Sacc., Syll., n. 445.

On the ground among grass.

The marginal hairs are short but very distinct, consequently the species cannot remain in *Barlaea*.

Type examined.

Very closely allied to *S. brunnea*, if indeed truly distinct; differing mainly in the reddish tone of the ascophore, shorter marginal hairs, and hyaline paraphyses.

**Sphaerospora brunnea.** Mass.

Gregarious or crowded, sessile, subglobose and closed at first, then becoming broadly expanded but having the margin permanently more or less raised, often wavy, rather fleshy, brittle, disc pale yellowish brown externally, and the margin darker than the disc and pilose, the hairs, which are most abundant and fasciculate at the margin, are cylindrical or very slightly tapering, ends obtuse, usually 1-septate, smooth, wall slightly thickened, sometimes slightly curved, pale yellowish brown,  $25-40 \times 5-7 \mu$ ; cortical cells large, irregularly polygonal  $10-18 \mu$  diameter; asci cylindrical, apex obtuse, narrowed below into a pedicel which is usually crooked at the base, 8-spored; spores globose, hyaline, smooth, 1-seriate,  $12-14 \mu$  diameter; paraphyses septate, the brownish clavate tips  $5-6 \mu$  broad.

*Peziza brunnea*, A. & S., Consp. Fung., n. 946, p. 317, tab. ix. fig 8; Cooke, Mycogr. fig. 126A (copied from Alb. & Schw.); not of Phil., Brit. Disc., p. 209.

On charcoal bed.

Described from a specimen from Schweinitz, now in Herb. Berk., Kew.

It is somewhat remarkable that the Schweinitzian specimen in Berkeley's herbarium should have been overlooked by both Cooke and Phillips. The species, as stated by Schweinitz, resembles *Lachnea hemispherica* in habit and in the fasciculate hairs, but differs in being smaller, of a uniform yellow-brown colour, and more especially in the globose spores.

**Sphaerospora Phillipsii.** Mass.

Ascophores gregarious, subcaespitose, sessile, hemispherical then depressed, subflexuose, brown, externally clothed with minute, rigid, fasciculate, brown, septate hairs; disc the same colour; asci cylindrical, spores 8, globose, asperate,  $15-18 \mu$ ; paraphyses slender, septate, apices clavate.

*Lachnea brunnea*, Phil., Brit. Disc., p. 209.

On the ground.

Ascophores 1-2 lines broad.

The above description embraces the characters of Albertini and Schweinitz's species, with the addition of microscopical characters of a plant referred to it by Mr. C. E. Broome, which agrees admirably in external characters. (Phil.)

Unknown to me, the above being copied from Phillips, Brit. Disc., p. 209. It will be observed that the present fungus was accepted by Phillips as the *Peziza brunnea*, Alb. & Schw., but examination of authentic specimens of the latter prove that the plant accepted by Phillips differs in the larger, asperate spores.

**Sphaerospora confusa.** Sacc., Syll., viii. n. 772.

Gregarious or scattered, sessile, 3-5 mm. across, closed at first, then gradually expanding until plane; disc dark purplish brown when young, then light brown when fully expanded, externally brown, the margin and for some distance down, studded with crowded fasciculate, bright brown, septate, thick-walled, pointed hairs,  $80-250 \times 7-10 \mu$ ; cortex parenchymatous, cells irregularly polygonal,  $12-20 \mu$  diameter; asci cylindrical, apex rounded, narrowed into a long pedicel, 8-spored; spores 1-seriate in the upper part of the ascus, hyaline, continuous, smooth, globose,  $11-13 \mu$  diameter (sometimes there are only 6 spores in an ascus); paraphyses slender, becoming slightly clavate upwards, septate, containing reddish-brown granules at the tip.

*Peziza confusa*, Cooke, Bull., Buffalo Acad. Sci., 1875, p. 291; Mycogr., fig. 124.

*Lachnea confusa*, Phil., Grev. xviii. p. 83.

*Peziza brunnea*, Nyl., Obs., p. 21.

On burnt soil, sand, &c.

Cups 2-6 mm. broad, partly immersed in the soil, having numerous brown, septate, entangled hairs at the base, the upper exposed surface and the margin clothed with short, stout, brown, fasciculate hairs, from  $30-70 \mu$  long, and 3-7 thick, tapering towards the summit. The cells of the pseudo-parenchyma are about  $10-15 \mu$  in diameter, but vary above this size in some individuals. It is very near *Peziza schizospora*, the chief difference being the hairy surface of the cup. (Phillips.)

\*\*\* *Disc black.*

**Sphaerospora nigrella.** Mass.

Gregarious or caespitose, sessile, globose and closed at first, then becoming hemispherical, tough, everywhere



blackish; disc shining when young, usually rugulose at maturity, externally, and the margin densely covered with cylindrical, blunt, septate, somewhat thin-walled, smooth, wavy, brown hyphae; base fibrillose, rooting; often irregular in form, contracted and the entire margin incurved when dry,  $\frac{1}{2}$ – $1\frac{1}{2}$  cm. across; hypothecium and excipulum formed of hyaline, densely interwoven hyphae, these change at the cortex into the external, coloured hyphae; asci cylindrical, apex obtuse, pedicel elongated, tapering downwards, crooked, 8-spored; spores 1-seriate, hyaline, smooth, globose, 10–11  $\mu$  diameter; paraphyses septate, numerous, slender, brownish at the thickened tips.

*Peziza nigrella*, Pers., Syn. p. 648; Cooke, Mycogr. fig. 120.

*Pseudoplectania nigrella*, Sacc., Syll., viii. n. 665.

On the ground in pine woods, rarely on rotten trunks.

The marginal hairs are not differentiated as in those of other species.

Specimen in Rehm's Ascom., n. 252, examined.

TAPESIA. Pers. (fig. 39, marked 40 at bottom of plate, and 41, p. 156).

Ascophore minute, thin, sessile, usually more or less narrowed at the base, closed at first, then becoming almost or quite plane, pilose or downy, seated on a more or less spreading subiculum formed of branched, interwoven hyphae; asci narrowly clavate, apex somewhat narrowed, 8-spored; spores irregularly 2-seriate, smooth, hyaline, elongated and narrow, continuous or septate; paraphyses slender.

*Tapesia*, Persoon, Myc. Eur., i. p. 270; Phil., Brit. Disc., p. 276; Sacc., Syll., viii. p. 371 (in part).

The leading character of the present genus is the gregarious ascophores being seated on a more or less spreading, colourless or coloured subiculum or thin, tomentose layer, formed of interwoven hyphae. In *Plectania* the ascophores are large, and the dense, strigose hyphae at the base do not form an extended layer on the matrix. There is a subiculum present in some species of *Humaria*, but here the ascophores are fleshy, and grow on the ground.

Growing on wood, branches, and dead leaves.



\* *Spores septate.*

*Tapesia fusca*. Fekl., Symb. Myc., p. 302; Phil., Brit. Disc., p. 282; Sacc., Syll., viii. n. 1541.

Subiculum dense and spongy, dark brown, formed of interwoven, branched, septate, rather thick-walled hyphae 5–6  $\mu$  thick, sometimes scanty or almost obsolete; ascophores gregarious, at first globose and closed, then becoming plane with a persistently upraised, often wavy margin, about 1 mm. across; disc plane, whitish or with a more or less decided tinge of honey-colour, externally glabrous, grey or brownish; excipulum parenchymatous, cortical cells irregularly polygonal, 7–10  $\mu$  across, brown, running out at the margin into obtuse, rounded tips; asci-cylindric-clavate, 8-spored, spores irregularly 2-seriate, hyaline smooth, narrowly elliptic-fusiform, usually very slightly curved, for a long time continuous, then sometimes becoming 1-septate,  $10\text{--}15 \times 2\cdot5\text{--}3 \mu$ ; paraphyses rather stout, becoming gradually clavate upwards, hyaline.

*Peziza fusca*, Pers., Obs., i. p. 29.

*Tapesia Johnstoni*, Phil., Brit. Disc., p. 282; Sacc., Syll., viii. n. 1570.

*Peziza Johnstoni*, Berk., Ann. Nat. Hist., n. 313.

On wood and bark, also on fallen pine leaves, &c.

Specimen named by Persoon examined; also Berk., Brit. Fung., n. 286, and Phil., Elv. Brit., n. 77.

Usually the blackish-brown subiculum is broadly effused, well developed, and presents a spongy appearance under a lens, at other times it is nearly absent.

Type of *T. Johnstoni* also examined.

*Var. rosae*. Mass.

Externally brown, tomentose; remainder as in the typical form.

*Peziza rosae*, Pers., Obs. Myc., ii. p. 82.

*Tapesia rosae*, Fekl., Symb. Myc., p. 301; Phil., Brit. Disc., p. 279; Sacc., Syll., viii. n. 1542.

On dry stems of various species of *Rosa*.

The present form is scarcely to be considered as a good variety. In the typical form the external cells of the cortex and margin are rounded or papillose, resembling undeveloped

hairs; in the present variety these hairs are developed to a greater or less extent.

*Var. prunicola.* Mass.

Ascophores larger than in the typical form, externally black downy.

*Tapesia prunicola*, Fekl., Symb. Myc., p. 302.

*Tapesia rosae*, var. *prunicola*, Phil., Brit. Disc. p. 279.

On branches of *Prunus spinosa*.

*Tapesia aurelia.* Phil., Brit. Disc., p. 280, pl. 8, fig. 50.

Ascophores scattered, sessile, seated on a thin, white, spreading subiculum, concave; externally and the margin pilose, hairs 4–5  $\mu$  thick, length variable, generally continuous, golden-yellow, the margin sometimes reddish; excipulum formed of interwoven hyphae; asci narrowly clavate, apex slightly narrowed, 8-spored; spores irregularly 1-seriate, or with a tendency to become 2-seriate, hyaline, narrowly elliptical, ends rather pointed, becoming 3-septate, 15–18  $\times$  4  $\mu$ ; paraphyses slender, hyaline, tips not thickened.

*Peziza aurelia*, Pers., Myc. Eur., p. 270.

*Belonidium aurelia.* De Not., Prof. Disc., p. 381; Sacc., Syll., viii. n. 2061.

On decaying oak leaves, bark, mast, &c., lying on the ground. Spring.

Specimens examined from Cke., Fung. Brit., n. 563, and Elv. Brit., n. 29.

*Tapesia aurata.* Mass.

Ascophores gregarious, sessile but narrowed below, closed at first, then expanded, margin erect, acute, disc yellowish or tawny, externally paler, and clothed with delicate, thin-walled, septate, cylindrical or slightly tapering, straight, colourless hairs, sometimes minutely rough near the tip, 60–85  $\times$  4  $\mu$ ; very thin and delicate, about  $\frac{1}{2}$  mm. across; seated on a thin, whitish subiculum formed of thin, branched, interwoven hyphae often extending for several centimetres; asci narrowly clavate, apex somewhat pointed and thick-walled, pedicel elongated, slender, 8-spored; spores arranged in a parallel fascicle in the ascus, hyaline, slender and elongated, apex slightly obtuse, base pointed, multiguttulate

then multiseptate, usually slightly bent,  $65-67 \times 2.5-3 \mu$ ; paraphyses very slender, hyaline, cylindrical, sometimes branched.

*Arachnopeziza aurata*, Fekl., Symb. Myc., p. 304 (1870).

*Belonidium auratum*, Sacc., Syll., viii. n. 2063.

*Peziza rhabdosperma*, B. & Br., Ann. Nat. Hist., n. 1621, with fig. (1876).

*Tapesia rhabdosperma*, Phil., Brit. Disc., p. 280.

On dead wood.

Berkeley's type examined, also Phil., Elv. Brit., n. 170, and Fuckel, Fung. Rhen., n. 2480. All three are identical.

**\*\* Spores continuous,**

***Tapesia eriobasis.*** Phil., Brit. Disc., p. 278; Sacc., Syll., viii. n. 1582.

Gregarious, sessile, closed at first, then plane or with the margin more or less raised, thin,  $\frac{3}{4}$ -1 mm. across, disc whitish or with a pale yellow tinge, especially when dry, outside white and downy, seated on a snow-white downy subiculum formed of branched, septate hyphae about  $4 \mu$  thick; asci clavate, 8-spored, apex slightly narrowed; spores 2-seriate, elliptic-oblong, hyaline, continuous,  $5-6 \times 1.5 \mu$ ; paraphyses very slender, cylindrical.

*Peziza eriobasis*, Berk., Ann. Nat. Hist., n. 312.

On the inside of bark.

Differs from other species in the ascophores being wider apart than usual in the genus. Each ascophore is surrounded by its own snow-white, radiating mass of hyphae, and when the ascophores are near to each other the white mycelium forms a spreading subiculum.

Disc sometimes bright yellow, especially when dry.

Type specimen examined.

***Tapesia caesia.*** Fekl., Symb. Myc., p. 301; Phil., Brit. Disc., p. 277; Sacc., Syll., viii. n. 1574. (figs. 39 (marked 40 at bottom of pl.), and 40, p. 156).

Sessile, gregarious or crowded, closed when young, becoming plane or with the margin slightly raised, thin, about  $\frac{1}{2}$  mm. across; disc subgelatinous, bluish-grey or brownish-grey, externally whitish and villose, seated on a continuous, effused, greyish-white subiculum formed of branched, sep-

tate hyphae about  $3\ \mu$  thick; asci clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, hyaline, continuous, elliptic-oblong,  $5-6 \times 1.5-2\ \mu$ ; paraphyses slender, cylindrical, hyaline.

*Peziza caesia*, Pers., Syn. Fung., p. 657.

On oak chips, and wood.

Distinct from other species by the gregarious, grey ascophores being seated on a dense but thin, continuous, greyish-white subiculum, which often forms patches several centimetres in extent. The subiculum assumes a yellowish tint on drying.

Specimen in Cke., Fung. Brit., n. 562, examined.

*Tapesia sanguinea*. Fekl., Symb. Myc., p. 303; Phil., Brit. Disc., p. 281; Sacc., Syll., n. 1528.

Ascophores gregarious, sessile, closed at first, then plane but having the margin permanently raised, about  $\frac{1}{2}$  mm. across, entirely blackish-olive; cortex formed of parallel rows of slender cells which run out into slender parallel, olive hyphae at the margin; seated on a spreading, thin subiculum varying in colour from deep rose to blood-red, formed of branching, septate hyphae,  $3-4\ \mu$  thick; asci rather broadly clavate, apex obtuse, pedicel stout, short, 8-spored; spores hyaline, continuous, elliptic-oblong,  $6-8 \times 2.5-3\ \mu$ ; paraphyses very slender, brownish at the slightly thickened tips.

*Peziza sanguinea*, Pers., Tent. Disp., p. 34.

On wood of fir, &c.

Distinguished by the minute, blackish ascophores being seated on a broadly effused, deep red subiculum.

Specimen in Karst., Fung. Fenn., n. 148, examined.

## PLECTANIA. Fuckel. (fig. 40, p. 290.)

Ascophore shortly stipitate, cup-shaped, fleshy or slightly tough, externally brown and flocculose, base coarsely strigose or fibrous with black hyphae; asci cylindrical, spores 8, continuous, hyaline, smooth; paraphyses present.

*Plectania*, Fuckel, Symb. Myc., p. 324; Sacc., Syll., viii. p. 163.

*Lachnea*, Phil., Brit. Disc., p. 216.

The densely fibrous black hyphae at the base of the ascophore is the most pronounced feature of the present genus. *Tapesia* differs in having the mycelium-subiculum effused over the matrix and not localised at the base of the ascophore.

*Plectania melastoma*. Fekl., Symb. Myc., p. 324. (fig. 40, p. 290.)

Ascophore 2-3 cm. across, cup-shaped, disc black, externally tomentose, brown becoming brick-red towards the margin; stem very short, rooting by no means of a dense mass of coarse black filaments; asci cylindrical, spores 8, uniseriate, elliptic-oblong, smooth, hyaline,  $21-25 \times 9 \mu$ ; paraphyses very numerous, filiform, very slightly thickened upwards.

*Peziza melastoma*, Sowerby, Brit. Fung., t. 149.

*Lachnea melastoma*, Phil., Brit. Disc., p. 216, pl. vii. fig. 40.

*Peziza atrorufa*, Grev., Scot. Cr. Fl., t. 315.

On rotten sticks, partly buried trunks, &c.

The external tomentum varies from mere pubescence to bristly hairs in different specimens. Strigose root hairs composed of blackish, septate hyphae 4-6  $\mu$  thick. Very cartilaginous when dry.

Sowerby's specimen figured on pl. 149, Brit. Fung., examined.

## ERINELLA. Quel. (emended).

Ascophore sessile or narrowed into a short stem-like base, closed at first, then more or less expanded; externally pilose, hairs everywhere alike in structure, thin-walled, septate, cylindrical, obtuse, minutely rough; asci cylindric-clavate, 8-spored; spores hyaline, elongated and narrow, 3-many-septate; paraphyses lanceolate.

*Erinella*, Quélet, Enchirid., p. 301; Sacc., Syll., viii., p. 507; Rehm, Krypt.-Flora, Disc., p. 910 (all in part).

*Peziza*, of old authors.

As defined above, the present genus differs from *Echinella*

in the absence of the differentiated bristle-like, marginal hairs, and lanceolate paraphyses, and from *Dasyscypha* in the 3-many-septate spores.

Growing on herbaceous stems and wood.

**Erinella apala.** Mass.

Closely gregarious or rarely scattered, stipitate, at first piriform and closed, gradually expanding until almost plane, thin, about  $\frac{3}{4}$  mm. broad, disc pale, externally fawn-colour, pilose, as is also the very short stem, hairs cylindrical, obtuse, minutely rough, straight, pale amber below, apex whitish,  $50-80 \times 4-5 \mu$ ; cortex parenchymatous, cells irregularly hexagonal,  $7-8 \times 4 \mu$ , yellowish; asci subcylindrical, apex obtuse, 8-spored; spores hyaline, filiform, straight or slightly bent, 3-7-septate at maturity,  $35-45 \times 1.5 \mu$ , arranged in a parallel fascicle in the ascus; paraphyses lanceolate, apex acute, longer than the asci, hyaline,  $4-5 \mu$  at the widest part.

*Peziza apala*, Berk. & Broome, Ann. Nat. Hist., n 561 (1851).

*Lachnella apala*, Phil., Brit. Disc., p. 253.

*Dasyscypha juncicola*, Fuckel, Symb. Myc., p. 305 (1869-70).

*Erinella juncicola*, Rehm, Krypt.-Flor., Disc., p. 911, figs. 1-4, p. 867.

*Erinella hapala*, Sacc., Syll., viii. n. 2099.

*Erinella juncicola*, Sacc., Syll., viii. n. 2098.

On dead stems of species of *Juncus*.

Distinguished by the long, filiform spores, which are at first continuous, and finally multiseptate.

Berkeley's type of *Peziza apala* examined, also Syd., Myc., March., n. 665.

**Erinella Nylanderii.** Rehm, Krypt.-Flora, Disc., p. 910

Scattered or gregarious, sessile, at first closed, then becoming plane with the margin slightly upraised, 1-2 mm. across, disc greyish or reddish-grey, externally yellow with a tinge of green, villose, hairs crowded, straight, septate, cylindrical, rather pointed or blunt, thin-walled, often minutely rough, very pale greenish-yellow,  $80-150 \times 4-5 \mu$ ; cortex parenchymatous; asci clavate, apex rather narrowed, 8-spored; spores irregularly 2-seriate, becoming almost

fasciculate, hyaline, long and narrowly fusiform, straight or slightly curved, at first 2-4-guttulate, then 5-7-septate,  $25-35 \times 2.5-3 \mu$ ; paraphyses narrowly lanceolate, apex not very acute, hyaline.

*Trichopeziza sulfurea*, Sacc., Syll., viii. n. 1653.

On dead nettle and other herbaceous stems.

Recognised by the yellow exterior of the ascophore and the long, narrowly fusiform, multiseptate spores. Hitherto confounded in this country with *Dasyascypha sulphurea*.

Specimen in Cke., Fung. Brit., n. 569. Examined.

### ECHINELLA. Mass. (n. gen.)

Ascophore sessile, at first closed then expanding, disc concave, the margin and for some distance down the outside clothed with brown hyphae; excipulum formed of slender, interwoven hyphae; asci clavate, 8-spored; spores irregularly 2-seriate, hyaline, narrowly fusiform, ends acute, slightly curved, distinctly 3-many-septate at maturity; paraphyses cylindrical or slightly clavate.

Readily distinguished by the setulose margin of the ascophore, and the hyaline, septate spores.

Allied to the genus *Pirottaea*, but differing in the distinctly septate spores.

Growing on plants. *Erinella* differs in the entire external surface and margin being covered with soft, cylindrical, obtuse hairs, and in the lanceolate paraphyses.

#### *Echinella vectis*. Mass.

Scattered or gregarious, superficial, minute, rarely exceeding  $\frac{1}{3}$  mm. across, subglobose and closed, then becoming hemispherical; disc pallid or pale grey, externally blackish-brown and furnished, especially at the margin, with dark brown, rigid hyphae  $35-50 \times 5-6 \mu$ ; excipulum formed of slender, interwoven hyphae; asci clavate, apex somewhat truncate, pedicel very short, slender, often oblique, 8-spored; spores hyaline, irregularly 2-seriate, narrowly fusiform, ends acute, distinctly 3-septate at maturity, curved,  $24-26 \times 2.5-3 \mu$ ; paraphyses slender, very slightly thickened upwards.

*Peziza vectis*, B. & Br., Ann. Nat. Hist., n. 957 (1861).



*Pirottacea vectis*, Sacc., Syll., viii. n. 1605; Phil., Brit. Disc., p. 284, pl. viii., fig. 52.

On dead stems of *Centaurea nigra*.

Type specimen examined.

For some unexplained reason, Phillips placed this species in Saccardo's genus *Pirottacea*, which is characterised by having continuous spores. Phillips translates Saccardo's generic character, and says "sporidia continuous," then in the specific diagnosis of his only species, says "sporidia 1 to 3-septate." In the Sylloge—viii. n. 1605—Saccardo has retained the present species in his genus *Pirottacea*, thus following Phillips, whose description he has copied; but has at the same time endeavoured to reconcile the anomaly of including a species with septate spores in a genus characterised by having continuous spores, as follows, "sporidiis (spuriis), 1-3-septatis."

#### *Echinella setulosa*. Mass. & Crossl.

Ascophores scattered or gregarious, sessile, at first quite closed and spherical, gradually expanding until almost quite plane with the extreme margin slightly incurved, often irregular and the margin wavy, up to 1 mm. across, disc grey, sometimes tinged pink, externally blackish-olive, margin whitish, setulose; excipulum composed of hyaline very much interwoven hyphae about  $4\ \mu$  thick; cortex distinctly parenchymatous, towards the base the cells are irregularly polygonal, and sooty-olive, 8-10 diameter, becoming smaller and with a tendency to be arranged in parallel lines upwards, and running out at the margin into thin-walled, slightly clavate, usually continuous, pale hairs, a few such hairs are scattered over the entire external surface; asci narrowly clavate, apex pointed, pedicel stout, often crooked, 8-spored; spores arranged in a parallel fascicle, hyaline, elongated, narrowly cylindric-fusoid, usually bent, 5-septate at maturity,  $38-45 \times 2.5-3\ \mu$ ; paraphyses rather stout, hyaline, cylindrical, about  $3\ \mu$  thick.

On old decorticated stems of *Calluna vulgaris*.

Type specimen examined.

Superficially resembling *Mollisia cinerea*, but on careful examination with a good pocket-lens the ascophore, more especially at the margin, is seen to be minutely pilose.

**Echinella senecionis.** Mass.

Gregarious, sessile, suberumpent, closed at first, then becoming almost plane, entirely black, closed when dry, up to  $\frac{1}{2}$  mm. across, externally, and the margin clothed with rigid, blackish-brown, smooth, almost opaque spines, these are longest and most numerous at the margin, where they are 1-2-septate, rather abruptly acuminate,  $40-50 \times 6-7 \mu$ ; cortex parenchymatous, cells brownish,  $6-8 \mu$  diameter; asci cylindric-clavate, apex slightly narrowed, base stout, 8-spored; spores 2-seriate, hyaline, narrowly cylindrical, sometimes with a tendency to become clavate, usually 2-guttulate, for a long time continuous, finally septate,  $8-14 \times 2 \mu$ ; paraphyses slender, slightly thickened upwards.

*Pirottaea veneta*, Sacc. & Speg., Mich., i. p. 24; Syll., viii. n. 1595; Bucknall, Bristol, Nat. Soc. Proc., vol. vi. Part 2, 1889-90, p. 6, pl. ii. fig. 9.

*Pirottaea gallica*, Sacc., Mich., ii. p. 82; Syll., viii. n. 1596. On dead herbaceous stems.

*Peziza senecionis*, Cke. & Phil., Grev. V. G., p. 104.

Distinguished among allies by the short spores. In the original description the spores are said to be continuous, but in a specimen in Kew herbarium, communicated by Spegazzini, I find some of the spores 1-septate, and the same is the case in the specimens contained in Speg., Dec. Myc. Ital. n. 19, also in the type of Cke. & Phil.

**Echinella Crosslandi.** Mass.

Gregarious or sometimes almost crowded, sessile, base narrowed, closed at first then expanded, but the margin remaining more or less erect, about 1 mm. across; disc pallid, externally pale brown, becoming buff or pale drab when dry, densely villose, hairs thin-walled, cylindrical, obtuse, minutely rough  $70-125 \times 4-5 \mu$ , straight, sparingly or not at all septate, yellow-brown, tips paler; cortex parenchymatous, cells irregularly polygonal,  $5-6 \mu$  diameter; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, smooth, hyaline, elliptical, multiguttulate then 3-septate,  $12-15 \times 4 \mu$ ; paraphyses slender, hyaline, cylindrical.

On decorticated wood.

Superficially resembling *Dasyscypha corticalis*, but distinguished by the 3-septate spores.

Found by Mr. C. Crossland, near Halifax.

**Echinella Stockii.** Mass.

Gregarious or crowded, sessile, at first closed and almost globose then becoming plane or the disc slightly concave and dark buff when moist, externally reddish-brown (in old specimens); sparingly covered with thin-walled, septate, pale, cylindrical, obtuse hairs, longest at the margin, and there measuring  $50-70 \times 6 \mu$ ; excipulum truly parenchymatous, cells small, cortical cells about  $10 \mu$  diameter, brown; about  $\frac{3}{4}$  mm. across, asci narrowly subcylindrical, 8-spored; spores 2-seriate, very narrowly fusiform, straight or slightly curved, hyaline, smooth, 3-septate,  $21-25 \times 2-2\frac{1}{2}$ ; paraphyses about  $2 \mu$  thick, almost cylindrical.

*Peziza Stockii*, Cke. & Phil., in Herb. Kew.

*Lachnella Stockii*, Phil., Brit. Disc., p. 261

*Belonidium Stockii*, Sacc., Syll., viii. n. 2048.

On dead herbaceous stems.

Type specimen examined.

**DIPLOCARPA.** Mass.

Ascophores minute, narrowed into a short stem-like base, closed at first, then becoming nearly plane, substance firm, externally and the margin densely pilose, hairs thin-walled, cylindrical, septate; hypothecium and excipulum parenchymatous, the cells becoming gradually larger towards the cortex; asci clavate, 8-spored; spores 2 seriate, hyaline finally 3-septate, paraphyses slender, bearing hyaline, septate fusiform conidia at their tips.

*Lachnella*, Phillips, Brit. Disc., p. 232.

*Peziza*, Currey.

Distinguished by the septate spores, and the large, septate, fusiform conidia borne at the tips of the paraphyses.

Growing on the ground.

**Diplocarpa Curreyana.** Mass.

Ascophore shortly stipitate, globose-depressed and closed at first, then expanding, the margin persistently raised,

2 × 3 mm. broad; externally and the margin clothed with thin-walled, septate, obtuse, straight or slightly wavy, reddish-brown hairs, 100–200 × 5–7  $\mu$ ; disc dingy olive, externally purple-brown, hypothecium and excipulum parenchymatous, cortical cells irregularly hexagonal, 8–12  $\mu$  across; asci clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, smooth, hyaline, elliptical, ends rather pointed, for a long time continuous and 2-guttulate, then becoming 3-septate 10–12 × 3  $\mu$ ; paraphyses slender, hyaline, as long as the asci, bearing at the tip a hyaline, fusiform, smooth, 3–5-septate conidium 30–50 × 5–6  $\mu$ .

*Peziza diplocarpa*, Currey, Linn. Trans., xxiv. p. 153, t. 25, figs. 30, 32–33.

*Lachnella diplocarpa*, Phil., Brit. Disc., p. 232; Sacc., Syll., viii. n. 1640.

On the ground,

When the conidia are mature they fall away; many were found germinating in the specimen examined. Some of the spores had a brownish tinge, but whether this is normal or due to age or poisoning for preservation, cannot be determined until fresh specimens are examined.

Type specimen, in Herb. Kew, examined.

### LACHNEA, Fries. (figs. 5–9, and 20, 21, p. 290.)

Ascophore sessile, margin at first incurved and depressoglobose, finally becoming quite plane, rather fleshy; disc bright coloured, whitish, or grey; externally hairy, hairs best developed at the margin, where they are straight, thick-walled, septate, pointed, coloured, and spreading like a fringe when the plant is expanded; cortex parenchymatous; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline continuous, elliptical, smooth or ornamented with warts or reticulations; paraphyses septate, clavate.

*Lachnea*, Fries, Syst. Myc., ii. p. 77; Phil., Brit. Disc., p. 201; Sacc., Syll., viii. p. 166 (all in part).

Growing on the ground, rarely on wood. Distinguished among genera having rigid, pointed, septate marginal hairs, by the continuous spores and clavate paraphyses.

\* *Disc blood-red, carmine, or orange-red.*

† *Spores smooth.*

**Lachnea carneo-sanguinea.** Phil., Brit. Disc., p. 222; Sacc., Syll., viii. n. 713.

Scattered or gregarious, fleshy, sessile, soon almost plane with an erect margin, 3–5 mm. across; excipulum parenchymatous, cells irregularly polygonal, 10–15  $\mu$  across; disc almost blood-red; externally pale brown, and rather densely clothed with rigid, pointed, thick-walled, septate, smooth, brown hairs which form an erect fringe round the margin, 50–120  $\times$  9–12  $\mu$ ; asci cylindrical, obliquely stipitate, 8-spored; spores, obliquely uniseriate, elliptical, ends obtuse, continuous, hyaline, smooth, 1–3 guttulate, 17–20  $\times$  9  $\times$  10  $\mu$ ; paraphyses filiform, septate, apex clavate, and 4–5  $\mu$  thick.

*Humaria carneo-sanguinea*, Fekl., Symb. Myc., p. 323.

*Peziza carneo-sanguinea*, Cke., Mycogr., p. 75, fig. 136.

On the ground.

Specimen in Fuckel's Fung. Rhen., n. 2288, examined.

**Lachnea hirtococcinea.** Phil. & Plow., Brit. Disc., p. 212.

Sessile, scattered or crowded, fleshy, hemispherical, then expanded, dull scarlet; clothed with scattered, pale brown, obtuse, septate hairs, longest on the incurved margin; disc same colour; asci cylindrical; spores 8, broadly elliptic, 1 to 2 guttulate, smooth, 22  $\times$  11  $\mu$ ; paraphyses rather slender, apices clavate, filled with scarlet granules.

*Peziza hirtococcinea*, Phil. & Plow., Grev., viii. p. 100.

On the ground in pine woods, in damp, mossy places.

Cups 2 to 4 lines broad. The hairs below the margin are shorter than those on the margin and are often clavate, with or without septa. There is in some instances a conspicuous white mycelium below the cups.

Unknown to me. The whole of the above is from Phillips, Brit. Disc., p. 212. I am not quite certain from the description, whether the present species should be included in *Lachnea* or *Sepultaria*.

**Lachnea umbrata.** Phil., Brit. Disc., p. 222; Sacc., Syll., viii. n. 701.

Scattered or gregarious, sessile, margin at first incurved and closed, then concave or nearly plane, rather fleshy,  $\frac{1}{2}$ – $\frac{3}{4}$  cm. across; disc vermilion or pinkish-red, paler and with an ochraceous tinge when dry, sometimes slightly umbilicate and the margin drooping when old; externally, and the margin clothed with slightly thick-walled, usually more or less wavy, septate or very slightly tapering, obtuse hairs, pale brown below, becoming almost colourless as a rule at the tip,  $150\text{--}200 \times 6\text{--}8 \mu$ ; cortex parenchymatous, cells irregularly polygonal,  $9\text{--}14 \mu$  across; asci cylindrical, apex obtuse, 8-spored; spores 1-seriate, hyaline, continuous, smooth, narrowly elliptical,  $16\text{--}18 \times 8\text{--}9 \mu$ ; paraphyses septate, the broadly clavate tips containing red granules.

*Peziza umbrata*, Fries, Summa Veg. Scand., p. 351; Cooke, Monogr., f. 137.

On the ground.

Distinguished among the red species by the narrowly ellipsoid, smooth spores, and the slender, obtuse, usually more or less wavy and comparatively thin-walled, pale marginal hairs.

***Lachnea coprinaria*.** Phil., Brit. Disc., p. 244; Sacc., Syll., viii. n. 721.

Ascophores scattered or sometimes gregarious, hemispherical and closed, becoming almost or quite plane; disc varying from orange-red to scarlet,  $\frac{1}{2}$ –1 cm. across; margin more or less erect, fringed with thick-walled, tapering, straight, septate, brown hairs  $300\text{--}500 \times 9\text{--}12 \mu$ ; cortex parenchymatous, cells irregularly polygonal, very large; asci cylindrical, apex somewhat truncate, 8-spored; spores hyaline, continuous, smooth, elliptical, ends obtuse,  $17\text{--}19 \times 8\text{--}9 \mu$ ; paraphyses septate, tips clavate, filled with orange granules.

*Peziza coprinaria*, Cooke, Grev., iv. p. 91; Mycogr., f. 149.

On cowdung. Autumn.

Cups 5 lines broad; external cells of cup very large; marginal hairs long, simple, septate,  $\frac{1}{2}$  mm. long, mixed with others that are shorter, usually confined to the margin, not branched or stellate. Cups remain flattened in drying. (Cooke.)



Very closely allied to *L. stercorea* ; differing mainly in the absence of external stellate hairs.

Type specimen examined.

*Lachnea stercorea*. Gill., Disc. Fr., p. 76 ; Phil., Brit. Disc., p. 223 ; Sacc., Syll., viii. n. 744.

Gregarious or scattered, sessile, fleshy, subglobose and closed when young, gradually expanding until plane ; disc dingy red, sometimes with an orange tinge, externally paler and pilose, 2-4 mm. across ; marginal hairs thick-walled, tapering to a point, base often more or less bulbous and branched where it springs from the cortical cells, smooth, brown,  $300-500 \times 9-12 \mu$  ; hairs below the margin stellate, rays 2-6, coloured, septate, attached by a short pedicel-cell to the cortical cells ; cortex parenchymatous, cells large ; asci cylindrical, apex somewhat truncate, pedicel narrowed, often crooked at the base, 8-spored ; spores 1-seriate, smooth, hyaline, continuous, elliptical, ends obtuse,  $17-20 \times 8-9 \mu$  ; paraphyses septate, clavate, filled with red granules, often nodulose or irregular.

*Peziza stercorea*, Pers., Obs., ii. p. 89 ; Mycogr., fig. 147.

On dung of various animals, often growing along with various species of *Ascobolus* and allied genera.

*Lachnea coprinaria* differs in the absence of stellate hairs on the exterior of the ascophore.

*L. crucipila* is very closely allied to the present species, differing mainly in the brighter red or crimson disc, and the shorter marginal hairs, and in not growing on dung.

*Lachnea crucipila*. Phil., Brit. Disc., p. 229.

Ascophore 2-3 mm. across, sessile, scattered, rather fleshy ; excipulum parenchymatous, cells irregularly polygonal,  $20-30 \mu$  diameter ; externally orange, pilose, hairs pale brown, thick-walled, septate, simple, bifurcate, triradiate, or cruciate on a short basal cell,  $100-200 \times 7-10 \mu$ , tapering to a point ; disc at maturity concave or almost plane, bright scarlet ; asci cylindrical ; spores 8, obliquely uniseriate, elliptic-oblong, smooth, continuous, hyaline,  $18-21 \times 8-10 \mu$  ; paraphyses filiform, becoming clavate upwards, apex  $4-5 \mu$  thick, containing red granules.

*Neottiella crucipila*, Sacc., Syll., viii. n. 781.

*Peziza crucipila*, Cke. & Phillips, Mycogr., fig. 237.



On the ground in damp and shady places, in woods, &c.

Type specimen examined.

Very close to *L. stercorea*; for details of differences see note under last-named species.

***Lachnea setosa*.** Phil., Brit. Disc., p. 406; Sacc., Syll., viii. n. 739; Mycogr., f. 133.

Gregarious, sessile; rather flesh, margin incurved and closed when young, then becoming saucer-shaped, 3-6 mm. across; becoming closed up when dry, and the marginal hairs collected into an erect brush-like tuft; disc orange or orange-red; pilose externally, marginal hairs very long and stout, strait, tapering to a point, wall very thick, transverse septa delicate, disappearing, often branched at the base, deep bright brown,  $300-550 \times 15-26 \mu$ ; cortex parenchymatous, cells irregularly hexagonal,  $15-20 \mu$  diameter; asci cylindrical, apex obtuse and slightly truncate, 8-spored; spores obliquely 1-seriate, smooth, hyaline, continuous, elliptical, ends obtuse, sometimes guttulate,  $16-20 \times 8-10 \mu$ ; paraphyses septate, slightly clavate, and containing red granules.

*Peziza setosa*, Nees, Syst., p. 260, f. 275.

On rotten wood, trunks, &c.

Somewhat resembling *L. scutellata*, but distinguished by the persistently smooth spores, and the very long, stout, marginal hairs, which are collected into a dense erect cluster when the ascophore is dry and contracted.

Specimens in Phil., Elv., n. 161, and Thum., Fung. Austr., n. 1013, examined.

***Lachnea hybrida*.** Phil., Brit. Disc., p. 214.

Gregarious, sessile, globose then more or less expanded, fleshy up to 2 cm. across; excipulum parenchymatous, cells large, irregularly polygonal, externally dingy ochraceous and clad, especially towards the margin with small clusters of stout, tapering, thick-walled, brown, septate hairs; disc concave, dingy orange; asci cylindrical, rounded at the apex, 8-spored; spores obliquely uniseriate, hyaline, continuous, often guttulate, smooth,  $21-25 \times 12 \mu$ ; paraphyses straight, septate, slightly thickened upwards.

*Peziza hybrida*, Sowerby, Eng. Fung., t. 369, fig. 1; Cooke, Hdbk., n. 2020; Cooke, Mycogr., 126 B.

On the ground.

I have examined the type specimen figured by Sowerby, now in the Kew Herbarium, and the above description is drawn up entirely from the result of this examination. It will be noticed that the present species has many important features in common with *L. hemispherica*, as stated by Sowerby, but differs in the orange-coloured disc and smooth spores. Phillips also examined the same specimens, but unfortunately his work—probably considering such specimens as too important and valuable to mutilate—was superficial.

The following is Sowerby's own account of his species.

"This *Peziza* resembles *P. hispida* [= *Lachnea hemispherica*], and is hairy on the outside, but whiter; the inside partakes of the redness of *P. scutellata*."

*Var. lapidaria.*

Disc orange-red; spores elliptical, smooth,  $16 \times 8 \mu$ ; in all other respects agreeing with the typical form.

*Peziza lapidaria*, Cooke, Grev., vol. xii. p. 43.

*Lachnea lapidaria*, Cke., in Phil., Brit. Disc., p. 211.

Growing between paving stones in an area.

Dr. Cooke has the following note on this variety in "Grevillea," vol. xii. p. 43; "Recently Mr. Cedric Bucknall has submitted to us specimens of a *Peziza* which, in our opinion, approximates most closely to the species of Sowerby (*P. hybrida*) of anything we had previously seen. The figures given by Sowerby represent the species very well, except that the disc is hardly so bright. All circumstances considered, we feel satisfied that it is most probable this is really the missing species."

The very imperfect description given by Phillips of Sowerby's specimen presumably led Dr. Cooke to the conclusion that his specimen was not identical with Sowerby's, and he therefore raised his fungus to the rank of a species, calling it *P. lapidaria*.

*Lachnea rubra.* Phil., Brit. Disc., p. 225.

Gregarious or sometimes crowded, sessile,  $\frac{1}{3}$ – $\frac{1}{2}$  cm. across, subglobose and closed when young, then becoming almost plane, fleshy; disc orange-red, externally paler, and sparingly sprinkled with stout, clear brown, thick-walled, 2–4 septate, smooth, pointed hairs, which are often more or less bent,  $125$ – $225 \times 10$ – $14 \mu$ ; cortex parenchymatous, cells irregular,

15–20 × 10–12  $\mu$ ; asci cylindrical, apex obtuse, 8-spored; spores 1-seriate, hyaline, smooth, continuous, broadly elliptical, ends obtuse, 16–18 × 8–9  $\mu$ ; paraphyses septate, apices broadly clavate or piriform, up to 10  $\mu$  broad.

*Peziza rubra*, Cooke, Mycogr., fig. 152, p. 83.

On spent hops, heaps of rotten leaves, &c.

Type specimen examined.

***Lachnea ascoboloides*. Mass.**

Ascophore up to  $\frac{1}{2}$  cm. across, almost globose at first, then expanded and concave, fleshy; disc pale orange-yellow, minutely granular or papillose, margin furnished scantily with erect, rather rigid, septate, hairs, slightly swollen at the base and tapering to an acute point, colourless, 60–70 × 6–7  $\mu$ ; externally pale orange, minutely downy, owing to the presence of colourless septate hyphae springing from the large cells of the excipulum; asci cylindrical, base narrowed; spores 8, obliquely uniseriate, smooth, hyaline, eguttulate, elliptic-oblong, ends obtuse, 16–18 × 8–9  $\mu$ ; paraphyses straight, 2  $\mu$  thick at base and gradually but slightly becoming clavate, 3–4  $\mu$  thick at the apex, sparingly or sometimes not at all septate, colourless.

*Peziza ascoboloides*, Bert., in Fl. Chil., vii. p. 402; Phil., Brit. Disc., p. 96; Cke., Mycogr., fig. 352.

*Peziza electa*, B. & Cke., Grev., 1876, p. 60.

*Neottiella ascoboloides*, Sacc., Syll., vii. n. 788.

On the ground and on dung,

Paraphyses in some instances irregularly clavate and inclined to branch near the apex. The marginal hairs are bristle-like, pointed, persistent, and quite distinct from the soft, septate, cylindrical hyphae that clothe the outside of the ascophore.

I have examined an authentic specimen collected by Bertero in Chili, and sent by Montagne to Berkeley,

†† *Spores rough at maturity.*

***Lachnea hirta*. Gillet, Champ. Fr., Disc., p. 75; Phil., Brit. Disc., p. 220; Sacc., Syll., viii. n. 705.**

Ascophores usually scattered, sessile, at first closed and almost globose, then expanding but the margin remaining

more or less incurved or erect, rather fleshy; disc deep carmine or scarlet, externally paler and clothed with thick-walled, smooth, septate, pointed, deep brown hairs, the marginal ones  $250-350 \times 9-12 \mu$ , sometimes inflated more or less below and the base often branching where it springs from the cortical cell; cortex parenchymatous, cells irregularly polygonal or subquadrate,  $12-20 \mu$  diameter; asci cylindrical, tip somewhat truncate, 8-spored; spores hyaline, continuous, elliptical, ends obtuse, often 1-2-guttulate, at first smooth, becoming rather coarsely warted at maturity,  $18-22 \times 8-10 \mu$ ; paraphyses septate, tips rather broadly clavate and filled with red granules.

*Peziza hirta*, Schum., Saell., p. 422; Cooke, Mycogr., fig. 128.

On the ground among moss, &c. Rarely on rotten wood, decaying Polyporei, &c.

Superficially resembling *L. scutellata*, but separated by the somewhat coarsely warted spores, and the persistently incurved margin of the ascophore.

Specimens examined in Phil., Elv. Brit., n. 19, and Rehm, Ascom., n. 505.

***Lachnea scutellata.*** Gillet, Disc. France, p. 75; Phil., Brit. Disc., p. 222; Sacc., Syll., viii. n. 698. (figs. 20, 21, p. 290.)

Ascophores usually gregarious, sessile, closed and subglobose at first, then expanded and plane, fixed by a central point, 3-8 mm. across; disc deep carmine or almost vermilion, externally pale red, furnished near the margin with large, brown, thick-walled, septate, pointed hairs,  $300-600 \times 15 \times 20 \mu$ ; excipulum parenchymatous, the cells largest at the periphery; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, elliptical, ends obtuse, continuous, for a long time smooth, then minutely verruculose,  $20-25 \times 11-14$ ; paraphyses septate, apex clavate and filled when growing with orange granules.

*Peziza scutellata*, Linn., Suec., n. 458; Cooke, Mycogr., fig. 131.

On rotten wood stumps, &c.

Specimen in Phil., Elv. Brit., n. 64, examined.

The very long marginal hairs and the bright red disc dis-

tinguish the present species. The spores are described by Phillips as smooth and granular within, and this is the condition in which they are generally found; but in the perfectly mature condition they are certainly verruculose; this stage is clearly seen in Karstens' specimens in Fung. Fenn., n. 144.

**Lachnea umbrorum.** Gillet, Champ. France, Disc., p. 209; Sacc., Syll., viii. n. 702; Phil., Brit. Disc., p. 219.

Usually scattered, sessile, hemispherical and closed at first, then becoming nearly plane, somewhat fleshy, 2-4 mm. across; disc vermilion with a tinge of pink or flesh-colour, externally and the margin clothed with short, brown, rigid hairs, the marginal ones thick-walled, more or less ventricose, acute, 1-2-septate,  $60-90 \times 8-9 \mu$ ; cortex parenchymatous, cells large; asci cylindrical, apex obtuse, 8-spored; spores obliquely 1-seriate, hyaline, continuous, broadly elliptical, ends very obtuse, for a long time smooth, finally minutely warted,  $18-21 \times 14-15 \mu$ ; paraphyses septate, the broadly clavated tips filled with red granules.

*Peziza umbrorum*, Cooke, Mycogr., fig. 138.

*Peziza umbrosa*, Fries, Syst. Myc., ii. p. 85 (in part).

On damp ground in shady places.

Distinguished by the short marginal hairs and the broadly elliptical spores.

\*\* *Disc yellow.*

**Lachnea vitellina.** Gillet, Champ. Fr., Disc., p. 74; Phil., Brit. Disc., p. 220; Sacc., Syl., viii. n. 726.

Gregarious or somewhat caespitose, hemispherical and closed when young, then expanded and often wavy, bright yellow; the margin fringed with thick-walled, straight, septate, pointed, brown hairs,  $150-300 \times 7-10 \mu$ ; cortex parenchymatous; 4-8 mm. across; asci cylindrical, apex obtuse, 8-spored; spores obliquely 1-seriate, continuous, hyaline, ornamented with delicate raised anastomosing ribs, enclosing very minute polygonal pits,  $18-21 \times 12-14 \mu$ ; paraphyses septate, tips thickened and containing yellow granules.

*Peziza vitellina*, Pers., Myc. Eur., p. 257; Mycogr., fig. 143.

On the ground.

Distinguished by the bright yellow colour, and the rough spores. The epispore is described as asperate by Cooke and Phillips, but when carefully examined it is seen to consist of very minute, depressed areas or polygonal pits, or in other words there is a raised reticulation spread over the surface, and enclosing irregularly polygonal areas,

Specimen determined by Dr. Mougeot, and now in Herb. Berk., accepted as typical. This is the specimen figured by Cooke in *Mycographia*, fig. 143.

*Lachnea theleboloides*. Gillet, Champ. Fr., Disc., p. 74; Phil., Brit. Disc., p. 225; Sacc., Syll., viii. n. 728.

Ascophores gregarious or crowded, sessile,  $\frac{1}{3}$ – $\frac{3}{4}$  cm. across, at first subglobose and closed, then hemispherical, finally expanding until almost plane, often wavy, rather fleshy; disc yellow, externally whitish, sparingly clothed with pale yellow or amber, slightly thick-walled, 2–4-septate, smooth, pointed hairs, measuring 70–120  $\times$  6–8  $\mu$  at the margin, where they are largest; cortex parenchymatous, cells irregularly polygonal, large, 15–24  $\times$  10–12  $\mu$ ; asci narrowly cylindrical, apex obtuse, pedicel somewhat elongated and narrowed downwards, 8-spored; spores 1-seriate, hyaline, continuous, smooth, elliptic-oblong, ends obtuse, 12–15  $\times$  6–7  $\mu$ ; paraphyses hyaline, septate, slightly clavate at the tips.

*Peziza theleboloides*, Alb. & Schw., Coasp. Fung., [p. 322, t. 12, fig. 4.

On spent hops and other decaying vegetable matter.

Cups 2½ lines broad; at first obovate or subcylindrical, concave, and expanded, when mature of a bright orange-colour within; beset externally with delicate, erect, white hairs, which are hyaline under the microscope; seated at first on a delicate white subiculum, which disappears as the plant advances to maturity, and the cups become crowded. (Berk. & Broome.)

Specimens examined in Phil., Elv. Brit., n. 20; and Cke., Fung. Brit., n. 571.

*Lachnea dalmeniensis*. Phil., Brit. Disc., p. 227; Sacc., Syll., viii. n. 730.

Scattered or gregarious, sessile, subglobose and closed, then

expanding, sometimes wavy, margin more or less erect, rather fleshy,  $\frac{1}{2}$ –1 cm. across; disc bright yellow; externally paler, pilose, hairs longest at the margin, where they are straight, tapering to a point, septate, slightly thick-walled, smooth, very pale yellow-brown, or sometimes almost colourless,  $250\text{--}350 \times 6\text{--}8 \mu$ ; cortical cells irregularly polygonal, large; asci cylindrical, apex obtuse, 8-spored; spores obliquely 1-seriate, continuous, hyaline, smooth, elliptic-oblong, ends obtuse,  $12\text{--}15 \times 7\text{--}8 \mu$ ; paraphyses septate, hyaline, tips clavate.

*Peziza dalmeniensis*, Cke., Grev., iii. p. 66, t. 34, fig. 121; Mycogr., fig. 153.

On the ground, often among nettles.

Type specimen examined.

Distinguished by the bright yellow disc, and the long, pale, marginal hairs.

\*\*\* *Disc white, pallid, or grey.*

† *Growing on the ground.*

***Lachnea hemispherica.*** Gillet, Champ. France, Disc., p. 73, with pl.; Phil., Brit. Disc., p. 211; Sacc., Syll., viii. n. 668. (figs. 5–9, p. 290).

Ascophore sessile, globose then hemispherical, at length almost or quite plane, the margin then slightly raised or sometimes turned back, often wavy; rather fleshy, brittle, excipulum parenchymatous, cells polygonal, large; externally dingy brown, furnished upwards with spreading, rigid, long, thick-walled, septate, brown hairs, attenuated to a point,  $8\text{--}10 \mu$  thick at the base, and sometimes more or less inclined to be bulbous, length very variable, arranged in small clusters; disc bluish-white; asci cylindrical, apex rounded, attenuated at the base, 8-spored; spores obliquely uniseriate, hyaline, continuous, often 2-guttulate, for a long time quite smooth, then very minutely asperate,  $17\text{--}25 \times 12\text{--}13 \mu$ ; paraphyses straight, septate, apex thickened and about  $4 \mu$  wide.

*Peziza hemispherica*, Wigg., in Hoffm., Crypt., ii. t. 7, fig. 6.



On the ground in shady places.

Specimen in Phillips, *Elv. Brit.*, n. 159 examined.

Scattered or gregarious, superficial or more or less immersed in the soil. The rigid brown hairs arranged in clusters, pale grey disc, and spores very minutely warted at maturity, distinguish the present species from *L. hybrida*, its nearest ally.

*Lachnea albo-spadicea*. Phil., *Brit. Disc.*, p. 228; *Sacc.*, *Syll.*, viii. n. 748.

Gregarious, sessile, globose at first, then expanding until it becomes plane, rather fleshy, 3–5 mm. across; disc white or with a tinge of pearly grey, externally brown, and clothed, especially at the margin, with pointed, thick-walled, septate hairs which are of a reddish-brown colour and often swollen near the base and contracted still lower down,  $80-120 \times 8-10 \mu$ ; excipulum truly parenchymatous, cells polygonal,  $8-12 \mu$  diameter; asci cylindrical, apex rounded, shortly stipitate, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, broadly elliptical, ends obtuse, often 1-guttulate,  $20-21 \times 9-10$ ; paraphyses septate, becoming gradually clavate upwards,  $4-5 \mu$  thick at the apex.

*Peziza albo-spadicea*, Grev., *Flor. Edin.*, p. 420; Cke., *Mycogr.*, fig. 141 (marginal hairs not characteristic).

On the ground in woods.

Specimen from Greville examined.

*Lachnea sublivida*. *Sacc. & Speg.*, *Mich.*, i. p. 443; *Sacc.*, *Syll.*, viii. n. 753.

Gregarious or scattered, sessile, at first closed then expanding and becoming quite plane and adpressed, sometimes wavy, substance rather thin, 5–10 mm. diameter; disc greyish-white, pallid or with an ochraceous tinge when old, externally densely pilose, marginal hairs slightly thick-walled, septate, tapering and acute, straight, pale ochraceous, often inflated at the base,  $150-300 \times 8-10 \mu$ , short, obtuse or subclavate hairs are intermixed; below the margin the hairs pass into hyaline, septate, branched hyphae that fix the fungus to the substratum; cortical cells mostly hexagonal slightly elongated in the direction from base to margin,  $10-14 \mu$  long; asci cylindrical, 8-spored; spores 1-seriate,

smooth, hyaline, continuous, elliptical,  $17-22 \times 10-12 \mu$ ; paraphyses septate, clavate.

On damp soil. The British specimens were communicated by Mr. C. Crossland of Halifax, and were found growing on a very thin layer of black dust that had settled on some pig-iron in a foundry at Hebden Bridge, Yorks.

Distinguished among the whitish species by the large size of the ascophore, and the rather thin-walled, pale ochraceous, marginal hairs.

**Lachnea Woolhopeia.** Phil., Brit. Disc., p. 215; Sacc., Syll., viii. n. 752; Cke., Mycogr., fig. 404.

Scattered, sessile, closed at first, then becoming nearly plane, rather fleshy, 1-3 mm. across, disc pale grey, externally pilose, hairs in clusters, marginal ones largest, brown at the base and becoming paler or almost colourless upwards, wall rather thin, ventricose and rather closely septate near the base, then running out into long, slender points:  $150-200 \times 9-12 \mu$ ; cortex parenchymatous; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, smooth, hyaline, broadly elliptical, ends obtuse, usually 1-guttulate,  $17-21 \times 9-12 \mu$ ; paraphyses slender, septate, slightly clavate.

*Peziza Woolhopeia*, Cke. & Phil., Grev., vi. p. 75.

On burnt ground, charcoal beds, &c.

Intermediate between *L. cretea* and *L. erinacea*, the marginal hairs being much stouter and darker in colour than the first named, whereas they are much smaller and paler than in the latter. The ascophore also is smaller in the present species than in either of those with which it is compared.

Type specimen examined.

**Lachnea gregaria.** Phil., Brit. Disc., p. 214; Sacc., Syll., viii. n. 685.

Gregarious, sessile, at first globose and closed, then hemispherical and the margin incurved, finally expanded, often irregular or wavy; disc brown then greyish, externally brown, and densely covered with rigid, tapering, septate, slightly thick-walled, straight, brown hairs, which are longest, and in dense clusters at the margin,  $100-400 \times 7-8 \mu$ , these spinulose hairs gradually pass into brown sep-

tate, branched hyphae towards the base of the ascophore; 1-3 mm. broad, closed when dry; hypothecium and excipulum brownish, composed of rather stout, branched and septate, compactly interlaced hyphae, these pass at the cortex into a brown, large-celled parenchyma; asci cylindrical, apex obtuse, pedicel elongated, stout, 8-spored; spores hyaline, smooth, continuous, obliquely 1-seriate in the upper part of the ascus, elliptical, usually 1-guttulate,  $19-25 \times 8-10 \mu$ ; paraphyses slender, septate, apex slightly clavate.

*Peziza gregaria*, Rehm, Ascom., n. 6, but first described by Winter in Hedw., 1872, p. 508.

On the ground.

Phillips says the spores are "externally minutely rough." This I have not observed, nevertheless it may be so. Cooke has figured the spores with a granular episporium in Fung. Brit. Exs., ed. ii., n. 368, but I find the episporium to be quite smooth in his specimens; the contents, however, are coarsely granular. Some of the spores are represented as having a granular episporium in Cooke's figure of this species in Mycographia, fig. 123.

Specimens examined in Rehm's Ascomy., n. 6; Cke., Fung. Brit. Elv., ii. n. 368; and Phillips, Elv. Brit., n. 111.

**Lachnea cretea.** Phil., Brit. Disc., p. 229; Sacc., Syll., viii. n. 749.

Scattered or gregarious, sessile, hemispherical and closed at first, finally quite plane, 1.5-4 mm. across; disc white, externally and the margin setulose, hairs spreading, straight, tapering to a point, septate, wall slightly thickened, pale brown,  $100-180 \times 5-7 \mu$ ; cortex parenchymatous; asci narrowly cylindrical, apex blunt, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, usually 2-guttulate, elliptical,  $12-15 \times 7-8 \mu$ ; paraphyses slender, septate, hyaline, slightly thickened upwards.

*Peziza cretea*, Cooke, Trans. Bot. Soc. Edin., 1877; p. 46, t. iii., K-N; Mycogr., fig. 362.

On plaster walls and ceilings.

Type specimen examined.

Disc white, surrounded by a pale yellowish brown fringed margin; the hairs are paler in colour and more slender than in most species, the spores are also comparatively small.

†† *Growing on wood and branches.*

***Lachnea erinacea.*** Sacc., Syll., viii. n. 741.

Gregarious, sessile, closed at first but soon becoming plane, rather fleshy, 3–6 mm. across; disc whitish, externally pilose, hairs bright brown, the marginal ones very long and stout, thick-walled, tapering to an acute point, septate,  $300\text{--}500 \times 14\text{--}18 \mu$ ; often branched at the base; cortex parenchymatous, cells large; asci cylindrical, apex slightly truncate, 8-spored; spores obliquely 1-seriate, broadly elliptical, ends obtuse, hyaline, smooth, usually 1-guttulate, contents often coarsely granular,  $17\text{--}20 \times 10 \mu$ ; paraphyses rather slender, septate, clavate.

*Peziza erinacea*, Schweinitz, Cooke, Mycogr., fig. 140.

On rotten wood.

Distinguished among the white species by the densely crowded, very long, stout marginal hairs.

Specimen from Schweinitz, now in Kew Herbarium, examined.

***Lachnea livida.*** Phil., Brit. Disc., p. 221 (spores incorrectly described as “asperate”); Sacc., Syll., viii. n. 759.

Gregarious, sessile, base narrowed, at first closed and subglobose, then becoming nearly plane, up to  $\frac{1}{2}$  cm. across; disc grey or dull lead-colour, externally, and the margin everywhere densely covered with stout, very thick-walled, septate brown hairs, slightly largest at the margin, and then  $200\text{--}250 \times 20\text{--}25 \mu$ , the tip in some cases is gradually narrowed to a point, in others quite obtuse; excipulum composed of radially parallel, septate hyaline hyphae, these become wider and pseudoparenchymatous at the cortex; asci cylindrical, 8-spored; spores obliquely uniseriate, hyaline, smooth, contents often granular, broadly elliptical; ends obtuse,  $18\text{--}20 \times 10\text{--}11 \mu$ ; paraphyses septate, clavate.

*Peziza livida*, Schum., Saell., ii. p. 422; Flor. Dan., t. 1915, fig. 3 (excellent); Cooke, Mycogr., p. 77, fig. 139 (spores incorrectly described and figured, asperate); Grevillea, vol. iii., fig. 222 (spores correctly represented as smooth, and contents granular).

On chips of wood. Spring.

Specimens determined by Berkeley accepted as typical,

and sent to him by Sir W. Jardine from Dumfriesshire. These same specimens were figured and described by Cooke, first in *Grevillea*, iii., fig. 222, where the spores are drawn with the epispore smooth, contents granular. Later on the same specimens are described in *Mycographia* as having the spores "asperules" and the drawing shows this. Phillips says the spores are "minutely asperate," but he had never seen a specimen, and copied Cooke's description in *Mycogr.* (spores rough), quoting at the same time the figure in *Grevillea* (spores smooth). I find by repeated examinations of Berkeley's specimens that the spores are permanently smooth.

Gillet's fungus, called *Lachnea livida*, Schum., Champ. France, p. 73, must be different to Berkeley's, as the spores are said to be "hérissés d'aspérités"; or is the description copied from *Mycographia*, and not from nature?

***Lachnea bulbo-crinita.*** Phil., Brit. Disc., p. 227.

Ascophores scattered, sessile, hemispherical, then expanded, fleshy; externally dusky brown, clothed with long, straight, brown, septate hairs, bulbous at the base; disc pallid or cinereous; asci cylindrical; spores 8, elliptic, smooth,  $20 \times 13 \mu$ ; paraphyses filiform.

*Peziza bulbo-crinita*, Phil., Scot. Nat., vi. 123.

On dead branches. Autumn.

Ascophores  $1\frac{1}{2}$  lines broad, at first closed, then concave; margin ciliated with long erect hairs ( $\frac{1}{2}$  a line), intermixed with shorter ( $300 \mu$ ), all having a bulbous basal cell. The disc is slate-colour. Allied to *Peziza erinacea*, Shwz., but hairs much longer, with a bulbous base, a darker disc, and paraphyses not enlarged at the summits.

Unknown to me. The above is copied from Phillips, Brit. Disc., p. 227.

The stout marginal hairs are more or less bulbous at the base in several species other than the present.

### *Excluded species.*

*Lachnea coerulea*, Phil., Brit. Disc., p. 230. (= *Peziza coerulea*, Bolton, t. 188, f. 2.)

*Lachnea erecta*, Phil., Brit. Disc., p. 226. (= *Peziza erecta*, Sow., Eng. Fung., t. 369, figs. 10, 11.)

DESMAZIERELLA. Libert (emended).

Receptacle sessile, becoming orbicular, dark-coloured, externally tomentose, margin setulose; hymenium minutely velvety due to the projecting black-pointed tips of the paraphyses; asci elongated, cylindrical, 8-spored; spores



*Desmazierella acicola*, Lib.;—Fig. 1, fungus on pine leaves,  $\times 2$ ;—Fig. 2, surface view of ascophore,  $\times$ ;—Fig. 3, section of same,  $\times$ ;—Fig. 4, branching hyphae from base of ascophore,  $\times 400$ ;—Fig. 5, free pores,  $\times 400$ ;—Fig. 6, asci and two clusters of the pointed paraphyses,  $\times 250$ .

hyaline, continuous, elliptical, 1-seriate; paraphyses adhering in bundles, becoming free, black and pointed at the tips.

*Desmazierella*, Libert, Ann. Sci. Nat., 1829, p. 82, pl. vi. figs. 1-3; Phil., Brit. Disc., p. 283; Sacc., Syll., viii. p. 386.

Distinguished by the peculiar structure of the paraphyses, and the hirsute margin of the ascophore.

Growing on pine leaves.

*Desmazierella acicola*. Libert, Ann. Sci. Nat., 1829, p. 82 with fig., Phil., Brit. Disc., p. 283; Sacc., Syll., viii. n. 1594.

Ascophores scattered, sessile, at first closed and turbinate, then expanded and orbicular, 3-5 mm. across; disc slightly concave, brown, minutely velvety, due to the projecting tips of the paraphyses; margin fringed with tapering, pointed, septate, dark brown hairs  $130-160 \times 6-7 \mu$ ; externally clothed with a tomentum formed of irregularly branched, septate, brown hyphae  $4-5 \mu$  thick; flesh thin, greyish; asci elongated, narrowly cylindrical, narrowed downwards into a long, slender, curved pedicel, 8-spored; spores obliquely 1-seriate, hyaline, continuous, usually 2-guttulate, elliptical,  $15-16 \times 8 \mu$ , paraphyses adhering in bundles, becoming free, black, and sharp-pointed at the tips, longer than the asci.

On dead leaves of *Pinus sylvestris*.

Specimen examined from Madame Libert's Crypt. Ard., n. 24.

Ascophore about  $2\frac{1}{2}$  lines broad. This appears at first as a minute, hairy *Chaetomium*-like body, nearly black, afterwards expanding into a sublentiform disc. The brown hairs of the hymenium, being prolongations of the paraphyses, give this plant a striking character. (Phillips.)

DASYSCYPHA. Fries. (figs. 1-2, 12, 24-25, p. 156.)

Ascophore minute, shortly stipitate or sessile, closed at first then expanding until nearly or quite plane, thin and delicate in texture, externally and the margin pilose, hairs thin-walled, cylindrical, obtuse, often rough with crystals of lime, stem short, slender; asci cylindric-clavate, 8-spored;



spores irregularly 2-seriate, hyaline, smooth, narrow and elongated, continuous, or 1-septate at maturity, paraphyses lanceolate and acute, or cylindrical, often longer than the asci.

*Dasyscypha*, Fries, Syst. Myc., ii. p. 89 (as a Tribe of the genus *Peziza*): Sacc., Syll., viii. p. 432 (in part).

*Lachnella*, Phil., Brit. Disc. (in part).

As here understood, the genus is characterised by the ascophore being minute, margin and externally villose; asci cylindric-clavate, 8-spored, spores narrow and elongated, hyaline; growing on plants. *Lachnea* differs in having the marginal hairs thick-walled and pointed; the species of *Neottiella* are distinguished by growing on the ground.

### ANALYSIS OF THE SPECIES.

#### A. Externally white.

† *Paraphyses lanceolate*.

\* *Disc white*.

\*\* *Disc coloured*.

†† *Paraphyses cylindrical*.

\* *Disc white*.

\*\* *Disc orange or yellow*.

#### B. Externally coloured.

† *Paraphyses lanceolate*.

\* *Disc brownish, reddish, or buff*.

\*\* *Disc yellow*.

†† *Paraphyses cylindrical*.

\* *Externally clear deep or pale yellow*.

\*\* *Externally brown, red, buff, or dingy.*

§ *Growing on dead herbaceous stems or leaves.*

§§ *Growing on bark, wood, or branches.*

§§§ *Growing on ferns.*

#### A. Externally white.

† *Paraphyses lanceolate.*

\* *Disc white.*

***Dasyscypha virginea.*** Fekl., Symb. Myc., p. 305; Sacc., Syll., n. 1801.

Scattered, or usually gregarious, shortly stipitate; globose then hemispherical, finally expanded with an upright, delicate margin, about  $\frac{2}{3}$  mm. broad; whole plant snow-white, or with a faint tinge of yellow on the very short, rather thick stem; excipulum composed of septate hyphae about  $4\ \mu$  thick, and more or less parallel, radiating from the stem to the margin; externally clothed with delicate, very thick-walled, cylindrical hairs  $3\text{--}4\ \mu$  thick, apex obtuse, and sometimes crowned with a crystal or amorphous lump of oxalate of lime, longest at the margin where they are up to  $100\ \mu$  long, and form a crowded fringe; asci cylindric-clavate, thick at the base; spores 8, irregularly biserial, slenderly fusiform, hyaline, continuous, straight,  $5\text{--}10 \times 1.5\text{--}2\ \mu$ ; paraphyses lanceolate, apex acute, about half as long again as the asci, colourless, about  $4\ \mu$  thick at the widest part.

*Peziza virginea*, Batsch, Elench. Fung., p. 125.

*Lachnella virginea*, Phil., Brit. Disc., p. 248.

*Lachnum virgineum*, Karst., Myc. Fenn., i. p. 169; Rehm, Krypt.-Flora, Disc., p. 872.

On rotten wood, branches, and herbaceous stems.

Characterised among the minute white species by the lanceolate paraphyses, slender, very thick-walled, blunt hairs, and radiating, long narrow cells of the excipulum. The walls of the marginal hairs are so thick that the lumen is usually almost obliterated, and although septate, the septa

in consequence are difficult to see; the hairs are sometimes tipped with a lump of lime, rarely crystalline, and sometimes several hairs are more or less clotted together with lime.

*Peziza plano-umbilicata*, Grev., Flor. Ed., p. 420, respecting which nothing is definitely known, may possibly belong to the present species.

***Dasyscypha scintillans*. Mass.**

Scattered, stipitate, globose and closed, then expanded, up to  $\frac{1}{3}$  mm. broad and high; thin, excipulum parenchymatous, consisting of more or less square cells, with a tendency to become arranged in lines near the margin, towards the base, the cells become long and narrow, externally white, pilose, the hairs longest and most numerous at the margin,  $40-60 \times 5-6 \mu$ , apex blunt or very slightly incrassated, and tipped with a large, globose cluster of sharp-pointed crystals of oxalate of lime, the sharp points of the crystals numerous and radiating in every direction, septate, often minutely rough, wall at first thin, becoming thick and the lumen almost obliterated; disc white or with a tinge of yellow; stem very short; asci cylindric-clavate, 8-spored, base rather thick; spores irregularly biseriate, cylindrical,  $7-8 \times 1 \mu$ ; paraphyses lanceolate, apex acute, about twice as long as the asci,  $5 \mu$  broad at the widest part, hyaline.

On dead oak leaves.

Differs from *D. ciliaris* in the smaller spores and long, broadly lanceolate paraphyses. *D. rhytismae* (= *D. echinulata*), Rehm), has the external hairs much thinner, and the cells of the excipulum are very long and narrow at the margin of the cup. Finally *D. ciliaris*—with which *D. echinulata*, Aud., is synonymous, as proved by examination of specimens named by Auerswald—has very much larger, fusiform spores.

Auerswald in describing his species, *Peziza echinulata*, Hedw., 1868, p. 136, gives the size of the spores as  $15-18 \times 2 \mu$ . Phillips' description of this species is a translation of Auerswald's original diagnosis quoted above, omitting the spore measurements.

When viewed under a low power of the microscope, the entire fungus resembles a minute tassel of snow white silk, each strand being tipped with a sparkling crystal.

**Dasyscypha rhytismatis.** Sacc., Syll., viii. n. 1886.

Gregarious, stipitate, entirely white, piriform and closed at first, then expanding until quite plane, about  $\frac{1}{2}$  mm. across; externally villose, marginal hairs longest, delicate, thin-walled, septate, obtuse cylindrical, rough with minute particles of lime, and usually bearing a large, rough, sparkling crystal at the apex,  $50-80 \times 3-4 \mu$ , the hairs becoming shorter downwards; cortex formed of simple or branching, parallel, septate hyphae, small and elongated in the direction from base to apex, about  $5-8 \times 3-4 \mu$ ; stem about  $\frac{1}{2}$  mm. long; asci small, clavate, apex slightly narrowed, 8-spored; spores 2-seriate, hyaline, smooth, continuous, cylindric-fusiform,  $3-5 \times 1 \mu$ ; paraphyses lanceolate, acute, nearly as long again as the asci, continuous,  $4 \mu$  at broadest part.

*Peziza rhytismae*, Phil., Grev., viii. p. 101.

*Lachnella rhytismae*, Phil., Brit. Disc., p. 250.

*Lachnum echinulatum*, Rehm, Krypt.-Flora, Disc., p. 876.

*Dasyscypha echinulata*, Sacc., Syll., viii. n. 1848.

On dead leaves of *Acer* on *Rhytisma acerinum*, also on oak leaves.

Specimen from Phillips examined, also Rehm., Ascom., n. 259.

**Dasyscypha nivea.** Mass.

Gregarious, snow-white, stipitate, at first pyriform and closed, then expanding but not becoming quite plane, epithecium parenchymatous, cells largest at the margin, where they are irregularly polygonal,  $6-9 \mu$  broad, slightly elongated radially, becoming longer and narrower downwards; externally pilose, hairs longest and most numerous at the fringed margin, cylindrical, apex often slightly clavate, septate, often minutely rough, rarely with a crystal at the tip,  $100-150 \times 3-4 \mu$ ; disc up to 1 mm. across when expanded; stem cylindrical, slender, pilose, about  $\frac{1}{3}$  mm. long; asci cylindric-clavate, 8-spored, apex rounded, base rather stout; spores irregularly biseriate, slenderly fusiform, continuous, hyaline,  $6-9 \times 1-1.5 \mu$ ; paraphyses lanceolate, apex acute, about half as long again as the asci,  $4-5 \mu$  broad at the widest part, hyaline.

*Octospora nivea*, Hedwig fl., Musc. Frond., tab. viii. fig. B.

*Lachnum niveum*, Karst., Myc. Fenn., i. p. 168; Rehm, Krypt.-Flora, Disc., p. 879.

*Trichopeziza nivea*, Fckl., Symb. Myc., p. 296.

On twigs, branches, wood, &c.

From the standpoint of species at the present day, it is absolutely impossible to say exactly which of the numerous minute white species Hedwig's *Octospora nivea* represents; and under the circumstances I have accepted as this species the form most generally accepted by mycologists, as indicated by the synonyms given above. This form does not accord with the species as understood by Phillips, Brit. Disc., p. 245; differing in the broad, lanceolate paraphyses.

Differs from *D. virginea* in the large cells at the margin of the excipulum and the septate hairs, and from *D. ciliaris* in the slender stem and lanceolate paraphyses.

***Dasyscypha acutipila*.** Sacc., Syll., viii. n. 1860.

Gregarious or scattered, shortly stipitate, globose and closed when young, then becoming quite plane, up to 1 mm. across; entirely white, or the disc sometimes tinged yellow; externally minutely downy; margin pilose, hairs thick-walled, smooth, septate, gradually tapering into a long, acuminate point,  $50-70 \times 4 \mu$ ; cortex composed of small, elongated cells; asci clavate, apex narrowed, 8-spored; spores 2-seriate, hyaline, smooth, continuous, narrowly fusiform,  $9-14 \times 1-1.5 \mu$ ; paraphyses lanceolate, tips acute, usually septate,  $4 \mu$  broad at widest part.

*Peziza acutipila*, Karsten, Mon. Pez., p. 195.

*Lachnella acutipila*, Phil., Brit. Disc., p. 252.

On *Phragmites communis* and other grasses.

Specimen in Karst., Fung. Fenn., n. 662, examined.

Distinguished by the linear-fusiform spores, and the short, acuminate, marginal hairs.

***Dasyscypha Soppittii*.** Mass. (fig. 12, p. 156.)

Scattered, stipitate, snow-white, globose and closed at first, finally becoming nearly or quite plane, the spreading margin ciliate, up to  $\frac{1}{2}$  mm. across; externally densely pilose, hairs thin-walled, cylindrical, sparsely septate, straight, minutely rough,  $60-90 \times 4 \mu$ ; cortex parenchymatous, cells almost quadrate,  $8-9 \mu$  diameter near the margin, becoming narrower and elongated downwards; asci broadly cylindric-

clavate, apex obtuse, pedicel short, stout, 8 spored; spores irregularly 2-seriate, smooth, hyaline, elliptical, ends acute, straight, 1-septate at maturity,  $9-11 \times 3 \mu$ ; paraphyses lanceolate, apex acute, 3-5-septate, often slightly constricted at the septa, half as long again as the asci,  $5-6 \mu$  at the broadest part.

On dead, fallen oak leaves.

The present species, found by Mr. H. T. Soppitt, near Bradford, Yorks, is amongst the most beautiful and distinct of the white species of *Dasyscypha*, distinguished by the large, quadrate cortical cells, septate paraphyses, and fusiform, 1-septate spores.

*Dasyscypha filicea*. Sacc., Syll., viii. n. 1879.

Gregarious, shortly stipitate, globose and closed at first, then hemispherical, entirely white, up to  $\frac{1}{2}$  mm. across; externally tomentose, hairs thin-walled, septate, obtuse and slightly thickened at the tips, minutely rough,  $40-70 \times 5 \mu$ ; cortex parenchymatous, cells elongated in the direction from base to margin,  $6-8 \times 3-4 \mu$ ; asci narrowly clavate, tip narrowed, 8-spored; spores 2-seriate, distinctly fusiform, ends acute, 1-septate, hyaline,  $15-18 \times 3 \mu$ ; paraphyses lanceolate, acute, rather longer than the asci,  $4-5 \mu$  at the broadest part.

*Peziza filicea*, Cooke and Phil., in Herb., Kew.

*Lachnella filicea*, Phil., Brit. Disc., p. 254.

On the under surface of the frond, and on the rachis of ferns.

Distinguished among the white species by the large, 1-septate, fusiform spores having sharp ends, and the more or less capitate, external hairs.

Type specimen examined.

In giving localities for this species, Phillips says, "Dunedin, N.B.!" in Herb., Kew"; on turning to this species, I find that the specimen is from Dunedin, New Zealand, Dr. Berggren, n. 400. As Phillips also gives Chedder, collected by C. Bucknall, it is included here.

*Dasyscypha crucifera*. Sacc., Syll., n. 1833.

Gregarious, stipitate, snow-white or with a very slight tinge of yellow on the stem; clavate, often hemispherical; excipulum composed of more or less parallel, elongated cells,

showing a tendency to become polygonal, 5-6  $\mu$  wide by 15-25  $\mu$  long, radiating from stem to margin; externally pilose, the hairs longest at the margin, where they form a fringe; 60-100  $\times$  4-5  $\mu$ , cylindrical, obtuse or very slightly thickened at the apex, which is crowned by a regular octahedron-crystal of oxalate of lime, usually rough with very minute particles of lime throughout their length, thin-walled, distinctly septate; asci cylindric-clavate, thick at the base, 8-spored; spores cylindrical or narrowly fusiform, straight, hyaline, continuous, 6-8  $\times$  1  $\mu$ ; paraphyses lanceolate, tip acute, about half as long again as the asci, hyaline, 4  $\mu$  thick at the widest part.

*Peziza crucifera*, Phil., Gard. Chron., 1878, p. 397, fig. 71.

*Lachnella crucifera*, Phil., Brit. Disc., p. 250.

On dead branches and twigs of *Myrica gale*.

Authentic specimen from Phillips examined.

Closely allied to *D. virginea*, differing in the slightly longer stem, larger cells of the excipulum, and more especially by the rough, thin-walled, distinctly septate hairs, each of which is tipped with a perfectly symmetrical, regular octahedral crystal of lime, the angles of which frequently present the appearance of a cross under the microscope. The crystals often drop off when the plant is placed in water for examination. *D. echinata*, Awd., differs from the present in the shorter, stouter, thick-walled hairs being tipped with a large aggregation of crystals having numerous projecting sharp points.

\*\* *Disc coloured.*

*Dasyscypha bicolor*. Fekl., Symb., (Myc., p. 305; Sacc., Syll., viii. n. 1827.

Scattered or crowded, very shortly stipitate, at first depresso-globose and closed, then expanded but not becoming plane,  $\frac{3}{4}$ -1 $\frac{1}{2}$  mm. across; disc varying in colour from yellow to deep orange, externally white, densely pilose, hairs slender, cylindrical, septate, obtuse, hyaline, minutely rough, sometimes inclined to be rather wavy, 150-250  $\times$  4-5  $\mu$ ; cortex parenchymatous, cells hexagonal, elongated in the direction from base to margin, running in more or less parallel series, 9-14  $\times$  5-7  $\mu$ ; asci small, cylindric-clavate,



8-spored; spores 2-seriate, hyaline, continuous, narrowly elliptical, or inclined to be clavate,  $7-10 \times 1.5 \mu$ ; paraphyses lanceolate, acute,  $5-6 \mu$  broad at the widest part, hyaline, continuous.

*Peziza bicolor*, Bull., Champ. Fr., t. 410, fig. 3.

*Lachnella bicolor*, Phil., Brit. Disc., p. 249, pl. viii. f. 46.

On dead branches of oak, hazel, hawthorn, &c.

The hairs appear to be continuous, as a rule, when examined in water, but when treated with white potassic hydrate, followed by iodine, the very thick walls and septa show very distinctly. Known from *D. calycina* and *D. resinaria* in not growing on conifers. *D. patula* differs in the very long hairs, and in growing on leaves.

Specimens examined in Berk., Brit. Fung., n. 155, and Kunze, Fung. Sel., n. 182.

*Dasyscypha patula*. Sacc., Syll., viii. n. 1844.

Gregarious; furnished with a very short stem, clavate then expanded, thin; excipulum composed of very long, narrow cells about  $4 \mu$  broad, arranged more or less parallel and radiating from the stem to the margin; externally white and densely covered with long, slender, slightly wavy, colourless, cylindrical, sharp pointed hairs, wall very thick and the lumen almost obliterated,  $70-120 \times 4-5 \mu$ , longest and most numerous at the margin; disc concave, pale yellow, up to  $\frac{1}{2}$  mm. broad and high; asci cylindric-clavate, base thickish, 8-spored; spores irregularly biseriate, slenderly fusiform,  $8-12 \times 1.5-2 \mu$ , hyaline, continuous; paraphyses lanceolate, apex pointed, about half as long again as the asci, colourless, about  $4 \mu$  thick.

*Peziza patula*, Pers., Obs. Myc., i. p. 42.

*Lachnella patula*, Phil., Brit. Disc., p. 251.

*Lachnum patulum*, Rehm, Krypt.-Flora, Disc., p. 875.

On dry fallen oak leaves.

A very beautiful, but minute species, when examined in the dry condition under a low power, resembling a minute ball of loose floss silk. The hairs are longer, and slenderer than in any other British species, slightly wavy, and more or less interwoven; the wall is very thick and the lumen—central cavity—almost obliterated, hence they appear to be without septa—continuous—but if treated with dilute potassic

hydrate, the very narrow lumen and the septa become evident.

***Dasyscypha conformis*.** Sacc., Syll., Suppl. ii. n. 4545.

Scattered, minute, shortly stipitate or sessile, rather cupulate, becoming plane, clad with short, colourless, obtuse hairs; disc pale fawn colour; asci cylindraneo-clavate; spores 8, slenderly lanceolate,  $10 \times 1 \mu$ ; paraphyses slender, acerose, exceeding the asci.

*Lachnella conformis*, Cooke., Grev., xix. p. 107.

On *Juncus*.

Although resembling *L. apala*, the much shorter spores at once distinguish it.

Unknown to me. The above is Cooke's original description. Unfortunately I have not succeeded in finding the type in Cooke's Herbarium.

†† *Paraphyses cylindrical*.

\* *Disc white*.

***Dasyscypha leuconica*.** Mass.

Gregarious, sessile but attached by a narrowed base; hemispherical then expanded, about  $\frac{1}{2}$  mm. across, entirely white, very thin and delicate; excipulum parenchymatous, cells irregular, rather large, externally rather sparsely pilose; hairs most numerous upwards and forming a ciliated margin,  $5-7 \mu$  thick at the base, soon contracted and then gradually tapering to a very fine long point,  $70-100 \mu$  long, usually 1-2 septate at the base, smooth; asci clavate or cylindric-clavate, 8-spored; spores irregularly biseriolate, elliptic-oblong, ends obtuse, smooth, continuous, hyaline,  $7-9 \times 2 \mu$ ; paraphyses filiform, about  $2 \mu$  thick, hyaline.

*Lachnella leuconica*, Phil., Brit. Disc., p. 267.

*Peziza leuconica*, Cke., in Herb.

On dead wood.

Type specimen examined.

The present species is in some respects intermediate between *Dasyscypha* and *Lachnea*, inclining towards the latter in the tapering hairs, incrassated at the base, and

forming a ciliated margin; but as the hairs are thin-walled, soft and rather wavy at times, and the entire fungus very thin and delicate, it is placed in the genus *Dasyscypha*.

***Dasyscypha candida*. Mass.**

Scattered, or more frequently gregarious, sessile and broadly adnate, very thin, soon plane with a slightly upraised margin that is often more or less wavy, every part snow white or disc pallid when old, up to 1 mm. broad; excipulum parenchymatous, cells small, irregularly polygonal; externally densely downy, hairs slightly clavate, 40–70  $\mu$  long by 3–5  $\mu$  at the thickened apex; mixed with the above are numerous elongated, very delicate hyphae about 3  $\mu$  thick which radiate from the ascophore and form a delicate cobweb-like subiculum on the matrix; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly biserial, cylindric-fusiform, straight or slightly curved, hyaline, for a long time continuous, finally 1-septate, 6–9  $\times$  1.5  $\mu$ ; paraphyses filiform, not thickened upwards, septate.

*Peziza candida*, Cooke, Grev., vol. i. p. 130.

*Lachnella candida*, Phil., Brit. Disc., p. 273.

*Trichopeziza candida*, Sacc., Syll., viii. n. 1678.

On dead stems of *Rubus*.

A remarkable and very distinct species, forming extended snow-white patches when gregarious. Inclining towards the genus *Tapesia*, from which it is distinguished by the delicate, floccose mycelium only anchoring the individual ascophores, and not forming an extended subiculum on the substratum.

Type specimen examined.

***Dasyscypha ciliaris*. Sacc., Syll., viii. n. 1843.**  
(figs. 1–2, p. 156.)

Gregarious or rarely scattered, shortly stipitate, almost globose at first then expanding and becoming almost plane, margin minutely ciliate, snow-white or with a very slight tinge of yellow on the slender, cylindrical stem, about  $\frac{1}{2}$  mm. high and broad, waxy; excipulum parenchymatous, towards the margin the cells are almost square in outline, 5–8  $\mu$  across, and with a tendency to be arranged in parallel rows; lower down the cells become longer and narrower; externally pilose, the hairs longest and most numerous at the margin,

where they form a delicate fringe,  $50-100 \times 4-6 \mu$ , wall thin, septate, apex rounded and often tipped with a large octahedral crystal of oxalate of lime; the entire hair often rough with very minute particles of lime; asci cylindric-clavate, 8-spored; spores irregularly biseriate, narrowly fusiform, hyaline, usually minutely 2-guttulate, and finally 1-septate,  $15-20 \times 2.5-3 \mu$ ; paraphyses scanty, almost cylindrical, apex rather pointed, a little longer than the asci,  $2\frac{1}{2} \mu$  thick, hyaline.

*Peziza ciliaris*, Schrader, Bot. Journ., ii. p. 63.

*Lachnella ciliaris*, Phil., Brit. Disc., p. 251.

*Lachnella echinulata*, Phil., Brit. Disc., p. 219.

*Lachnum ciliare*, Rehm, Krypt.-Flora, Disc., p. 877, figs. 1-4, p. 866.

*Trichopeziza capitata*, Sacc., Syll., viii. n. 1719.

On fallen leaves of oak and sweet chestnut.

The leading points of the present species are, the quadrate cells near margin of excipulum, cylindrical paraphyses, and thin walled, septate hairs.

Auerswald in describing his *Peziza echinulata* quotes Rabenh., Fung. Eur., n. 1009, but an examination of this specimen shows it to be *D. ciliaris*.

### **Dasyscypha ascuna. Mass.**

Scattered, sessile, globose at first, then becoming almost plane, about  $\frac{1}{3}$  mm. across, entirely dingy white; excipulum very delicate, parenchymatous, cells small; externally sparsely pilose, hairs most abundant at the margin, thin-walled, septate, slightly tapering,  $50-75 \times 5-6 \mu$ ; asci clavate, apex narrowed, 8-spored: spores irregularly 2-seriate, cylindric-fusoid or with the apex obtuse and slightly clavate, hyaline, continuous, smooth, straight,  $10-15 \times 3-4 \mu$ ; paraphyses scanty, filiform.

*Lachnella ascuna*, Phil., Grev., xix. p. 73.

*Trichopeziza ascuna*, Sacc., Syll., Suppl. x. n. 4542.

On dead leaves of *Carex*.

Specimen from Phillips, in Herb., Kew, examined.

### **Dasyscypha aranea. Mass.**

Gregarious, sessile, hemispherical then expanding somewhat, but not becoming plane, about  $\frac{1}{3}$  mm. across, altogether white, the hymenium becoming yellowish when dry; exci-

pulum delicate, parenchymatous, cells small, elongated radially; clothed externally with delicate, branched, aseptate, cylindrical, hyaline hairs about  $3\ \mu$  diameter, most abundant near the margin, interwoven, length variable,  $60-100\ \mu$ ; asci cylindric-clavate, 8-spored; spores irregularly biseriate, linear-elliptic or cylindrical,  $7-8 \times 1.5\ \mu$ , hyaline, continuous; paraphyses slender, rather longer than the asci, apex not thickened.

*Peziza aranea*, De Notar., Micr. Ital., Dec. i. n. 1.

*Lachnella aranea*, Phillips, Brit. Disc., p. 272.

*Trichopeziza aranea*, Sacc., Syll., viii. n. 1715.

Inside fallen husks of Spanish chestnut.

Allied to *D. araneo-cincta*, but distinguished by the cylindrical, branched, wavy hairs and the slender paraphyses.

Specimen in Phillips' *Elv. Brit.*, n. 165, examined.

### ***Dasyscypha araneo-cincta*. Mass.**

Scattered and gregarious, sessile but attached by a central point only, hemispherical then expanded and concave, about  $\frac{1}{3}$  mm. across, entirely white, disc yellowish when dry; excipulum delicate, parenchymatous, cells small, elongate radially; externally delicately pilose, hairs most numerous near the margin, tapering regularly from base to apex,  $60-100\ \mu$  long,  $5-6\ \mu$  thick at the base,  $1.5\ \mu$  thick at the apex, thin walled, indistinctly septate, rather wavy; asci clavate, usually curved, 8-spored, spores irregularly biseriate, fusiform, or the apex sometimes obtuse,  $10-13 \times 1.5\ \mu$ , continuous, hyaline; paraphyses stout, apex clavate.

*Peziza araneo-cincta*, Phil., Bucknall's Fung. Bristol, n. 621.

*Lachnella araneo-cincta*, Phil., Brit. Disc., p. 271.

*Trichopeziza araneo-cincta*, Sacc., Syll., viii. n. 1721.

On decaying birch leaves.

Allied to *D. aranea*, but distinguished by the tapering, pointed hairs and clavate paraphyses.

### ***Dasyscypha acuum*. Sacc., Syll., viii. n. 1845.**

Ascophores gregarious or scattered, shortly stipitate, at first globose and closed, finally becoming nearly plane,  $\frac{1}{4}-\frac{1}{3}$  mm. across; entirely white, or more or less tinged with pink, especially when dry; externally minutely villose, hairs very short and delicate, thin-walled, cylindrical, obtuse, rarely 1-septate,  $20-30 \times 3-4\ \mu$ ; cortex delicately parenchy-

matous, cells elongated in the direction from base to apex,  $5-7 \times 3-4 \mu$ ; asci small, apex slightly narrowed, base short, stout, 8-spored; spores 2-seriate hyaline, smooth, continuous, elliptic-fusiform,  $4-5 \times 1.5 \mu$ ; paraphyses hyaline, slender, cylindrical.

*Peziza acuum*, Alb. & Schw., Consp. Fung., p. 330.

*Lachnella acuum*, Phil., Brit. Disc., p. 246.

On fallen, decaying pine leaves.

A very minute species, recognised by the very short, external hairs, the minute spores, and the habitat. The paraphyses are not 1-seriate as described by Phillips, neither are the paraphyses diffuent in water, as stated by the same author, but they are very difficult to see until shown up by a solution of iodine.

Specimens examined in Phil., Elv. Brit., n. 163 and Fuckel, Fung. Rhen., n. 1153.

***Dasyscypha aspidiicola*.** Sacc., Syll., viii. n. 1878.

Gregarious, gradually narrowed downwards into a stout stem-like base, globose and closed at first, gradually becoming plane, entirely-white,  $\frac{1}{4}-\frac{1}{3}$  mm. across; externally minutely flobose, hairs short, thin-walled, usually aseptate, cylindrical or slightly clavate, often minutely rough,  $25-35 \times 3-4 \mu$ ; cortex parenchymatous, cells irregularly polygonal,  $4-6 \mu$  diameter; asci small, cylindric-clavate, 8-spored; spores hyaline, continuous, narrowly elliptical or inclined to be clavate,  $5-8 \times 1-5 \mu$  2-seriate; paraphyses very slender, cylindrical.

*Peziza aspidiicola*, B & Br., Ann. Nat. Hist., n. 771.

*Lachnella aspidiicola*, Phil., Brit. Disc., p. 245.

On dead stems of *Nephrodium filix-mas*.

Type specimen examined, also specimens in Fung. Brit., n. 565.

***Dasyscypha hyalina*.** Mass.

Gregarious, sessile, globose and closed at first, then hemispherical, finally plane, very thin, soft, and translucent, colourless or sometimes with a faint tinge of yellow or rose, up to  $\frac{1}{2}$  mm. across, contracted and with a tinge of amber when dry; externally very minutely villose, hairs delicate, thin-walled, septate, cylindrical, often minutely



rough, hyaline,  $30-50 \times 3-4 \mu$ ; cortex minutely parenchymatous, the cells becoming parallel and running out into the marginal hairs; asci narrowly clavate, apex narrowed, pedicel short, stout, 8-spored; spores hyaline, continuous, straight or slightly bent, cylindric-fusiform, or with the broadest part above the middle, and inclined to be clavate, 2-seriate or often almost 1-seriate,  $6-10 \times 2-2.5 \mu$ ; paraphyses very slender, cylindrical, hyaline.

*Peziza hyalina*, Pers., Disp. Meth. Fung., p. 33.

*Lachnella hyalina*, Phil., Brit. Disc., p. 267, pl. viii. fig. 48.

*Pseudohelotium hyalinum*, Fekl., Symb.-Myc., p. 298.

On wood, chips, inside bark, &c.

Distinguished by the white, semitransparent, watery aspect of the ascophore when fresh, and by the very short, delicate, external hairs.

Specimen in Rab., Fung. Eur., n. 1615, examined.

### ***Dasyscypha carinata*. Mass. (figs. 24, 25, p. 156.)**

Ascophore sessile, about  $\frac{1}{4}$  mm. across, gregarious, every part snow-white, globose at first and with a minute pore, at length expanding a little; externally clad with short tomentose down formed of slender aseptate hyphae; longitudinally channelled so as to present 5-7 distinct acute ridges or keels; asci clavate, not much narrowed at the base, spores 8, irregularly biseriate, subfusiform, continuous, hyaline, guttulate,  $11-16 \times 3 \mu$ ; paraphyses filiform.

*Trichopeziza carinata*, Cke. & Mass., Grev., v. 21, p. 121.

On dead fern stems.

Among the most beautiful of the many interesting species of fungi found by my friend Mr. C. Crossland of Halifax. Readily distinguished by the distinct external, longitudinal grooves.

*Trichopeziza hexagona*, Fekl., not yet recorded for Britain, externally resembles the present species, but has much smaller spores.

### ***Dasyscypha asterostoma*. Mass.**

Gregarious or scattered, minute, sessile, at first globose and closed, then cylindric-globose, opening circular, rather contracted, everywhere pure white, both when fresh and dry, very thin and delicate, up to  $\frac{1}{4}$  mm. across, externally pilose,



hairs abundant round the margin, scanty elsewhere, hyaline, continuous, very thick-walled, smooth, cylindrical, apex more or less acute, crooked,  $70-100 \times 4-5 \mu$ , spreading and pointing obliquely all in one direction round the margin; cortical cells almost quadrate,  $7-9 \mu$  diameter; asci small, cylindric-clavate, apex slightly narrowed, 8-spored; spores, irregularly 2-seriate, hyaline, continuous, narrowly cylindric-fusiform,  $6.7 \times 1.5 \mu$ ; paraphyses very slender, hyaline, cylindrical.

*Peziza asterostoma*, Phil., Grev., vii. p. 140.

*Peziza spirotricha*, Oudem., Hedw. 1874, p. 87; Phil., Brit. Disc., p. 266.

*Trichopeziza spirotricha*, Sacc., Syll., viii. n. 1667.

On dead stems of herbaceous plants. Spring.

Phillips first described the present species as *Peziza asterostoma*, in Grev., vii. p. 140, and afterwards, considering it to be identical with *Peziza spirotricha*, Oudemans, adopted the latter name in Elv. Brit., n. 168, and in Brit. Disc., p. 266. Examination of an authentic specimen of *P. spirotricha* from Oudemans shows that Phillips' fungus is quite distinct, hence the original specific name has been restored.

Readily distinguished by the form of the ascophore, with its somewhat contracted mouth, and the marginal zone of thick-walled, crooked, obliquely inserted hairs.

### ***Dasyscypha tami*. Mass.**

Scattered, rarely gregarious, very thin and delicate, sessile, base narrowed, up to  $\frac{1}{2}$  mm. across; entirely white and translucent when fresh, becoming amber-colour when dry; externally minutely downy, hairs very delicate, about  $20-30 \times 2.5 \mu$ ; margin entire; cortex parenchymatous, cells irregularly polygonal,  $4-5 \mu$  diameter; asci small, narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, hyaline continuous, linear-fusiform,  $7-8 \times 1.5 \mu$ ; paraphyses very slender, hyaline, cylindrical.

*Peziza tami*, Lamy, in Desm., Crypt. Fr., ser. ii., n. 827.

Var. *humuli*, Phil., Brit. Disc., p. 270.

*Trichopeziza tami*, Sacc., Syll., viii. n. 1863.

On dead stems of *Tamus communis* and hop.

A very minute, delicate species, allied to *D. micacea*, according to Desmazières. Very nearly glabrous, but retain-

ing otherwise the morphological characteristics of *Dasyscypha*. A specimen examined in Desm., Cr. Fr., n. 827, also the specimens called var. *humili*, which do not differ from the typical form.

***Dasyscypha punctoidea*. Mass.**

Scattered or mostly gregarious, sessile but narrowed to a short stem-like base, closed at first, then expanding until plane or even slightly convex, about  $\frac{1}{4}$  mm. across; white and rather translucent, disc becoming tinged red when dry, nearly smooth externally; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores hyaline, irregularly 2-seriate,  $5-6 \times 2-2.5 \mu$ , continuous, elliptical; paraphyses very slender, cylindrical.

*Helotium punctoidium*, Karsten, Myc. Fenn., p. 151.

*Lachnella punctoidea*, Phil., Brit. Disc., p. 268.

*Pseudohelotium punctoideum*, Sacc., Syll., viii. n. 1230.

On dead leaves of species of *Epilobium*.

Imperfectly known to me. I have examined the specimens in Karsten's Fung. Fenn., n. 745, and also the British specimens referred to this species by Cooke—Fung. Brit., ed. ii., n. 551—but the species is so very minute and delicate, that very little can be determined from specimens that have been dried. It appears at best to be a very unsatisfactory *Dasyscypha*, and yet too delicate for *Helotium*.

***Dasyscypha fugiens*. Mass.**

Scattered, sessile, globose then expanded, thin, white, villose; asci oblong-clavate or subfusiform; spores 4 to 8, oblong-linear or elliptic, straight or slightly curved,  $7 \times 2 \mu$ .

*Peziza fugiens*, Phil., Proc. Bristol Nat. Soc., vol. iii. p. 137, t. iv. fig. 2.

*Tricopeziza fugiens*, Sacc., Syll., viii. n. 1744.

*Lachnella fugiens*, Phil., Brit. Disc., p. 268.

On dead rushes in bogs.

Ascophores,  $50 \mu$  broad; asci,  $20 \mu$  long,  $5 \mu$  broad; the hairs of the exterior very short, non-septate, colourless. (Phillips.)

Unknown to me. The above account is entirely copied from Phillips, Brit. Disc., p. 268.

\*\* *Disc orange or yellow.*

***Dasyscypha calycina*, Fekl., Symb. Myc., p. 305.**

Ascophores caespitose, gregarious, or scattered, narrowed into a short, stout, stem-like base, rather fleshy, 1-3 mm. broad; disc orange-yellow, externally white and villose hairs rather wavy, cylindrical, obtuse, colourless, minutely rough,  $100-150 \times 4-5 \mu$ ; asci subcylindrical, apex obtuse, 8-spored; spores 1-seriate or inclined to be 2-seriate above, hyaline, elliptic-fusiform, continuous,  $18-25 \times 6-8 \mu$ ; paraphyses slender, hyaline, cylindrical.

*Peziza calycina*, Schum., Enum. Pl., Saell., ii. p. 424 (in part).

*Peziza Willkommii*, Hartig, Willkomm, Mikr. Feinde d. Waldes, ii. p. 167.

*Lachnella calycina*, Phil., Brit. Disc., p. 241.

On bark of larch and Scotch fir.

Hypothecium and excipulum formed of slender, branched hyphae about  $2-3 \mu$  thick: these become more or less parallel to form the cortex, and finally run out into the external hairs. This fungus is very destructive to young larch-trees. For distinctions from allied species, see note under *D. abietis*.

Specimens examined in Fuckel, Fung. Rhen., n. 1206, and Cooke, Fung. Brit., n. 474.

*Var. Trevelyani*, Cooke, Grev., iii. p. 101: Phil., Brit. Disc., p. 242.

Distinguished from the type form by the larger spores,  $30-35 \mu$  long, and by their tendency to become pseudo-uniseptate.

On larch.

***Dasyscypha subtilissima*, Sacc., Syll., viii. n. 1823.**

Gregarious or scattered, narrowed into a stout, short, stem-like base, globose and closed at first, then expanded. 1-2 mm. broad; disc orange-yellow, externally white and villose, hairs more or less wavy, cylindrical, obtuse, thin-walled, minutely rough, colourless,  $80-120 \times 3-4 \mu$ ; asci narrowly cylindrical-clavate, 8-spored; spores hyaline, continuous, straight, ellip-

tical or slightly clavate,  $8-10 \times 2 \mu$ ; paraphyses slender, hyaline, cylindrical.

*Peziza subtilissima*, Cooke, Grev., iii. p. 121, fig. 167.

*Lachnella subtilissima*, Phil., Brit. Disc., p. 244.

On bark of firs.

See note under *D. abietis* for distinction from allies.

Type specimen examined.

***Dasyscypha abietis***, Sacc., Syll., viii. n. 1824.

Scattered or gregarious, narrowed into a short, stout, stem-like base, rather fleshy, 1-1.5 mm. across; disc orange-yellow, externally white and villose, hairs rather wavy, cylindrical, obtuse, thin-walled, septate, colourless,  $150-200 \times 4-5 \mu$ ; cortex formed of oblong cells in parallel rows running from base to margin,  $6-7 \times 3-4 \mu$ ; asci broadly clavate, gradually tapering downwards from the broad, very obtuse apex, 8-spored; spores 2-seriate, hyaline, elliptic, ends very acute, straight or slightly curved, 2-guttulate then 1-septate,  $12-14 \times 3 \mu$ ; paraphyses hyaline, cylindrical, tips rather pointed,  $2.5-3 \mu$  thick, longer than the asci.

*Lachnella abietis*, Karsten, Rev. Mon., p. 131.

On *Abies excelsa*.

The above description is drawn up from the specimens in the Kew copy of Karsten's Fung. Fenn., no. 837, with which British specimens exactly agree.

So far as the external characters of the ascophore are concerned, the present species is practically indistinguishable from *D. calycina* and *D. subtilissima*. The three species may be contrasted as follows.

*D. calycina*, spores  $18-25 \times 6-8 \mu$ .

*D. subtilissima*, spores  $8-10 \times 2 \mu$ , paraphyses same length as the asci.

*D. abietis*, spores  $12-14 \times 3 \mu$ , paraphyses longer than the asci.

***Dasyscypha resinaria***, Rehm, Ascom. Lojk, n. 30; Sacc., Syll., viii. n. 1826.

Gregarious; ascophore stipitate, turbinate then expanded, margin more or less persistently incurved,  $\frac{3}{4}$ -1 mm. across,  $1\frac{1}{2}$  mm. high, externally white, the short stem and excipulum clothed with short, spreading, unbranched, septate, white hairs about  $40-60 \times 4 \mu$ , rough with minute, external parti-

cles of lime; excipulum composed of densely interwoven, slender hyphae, colourless; disc concave, pale orange; asci small, cylindric-clavate, 8-spored; spores elliptical, hyaline, smooth, continuous,  $3 \times 1.5-2 \mu$ , irregularly biseriate; paraphyses slender, about  $1\frac{1}{2} \mu$  thick, slightly longer than the asci, tip very slightly or not at all thickened, colourless.

*Peziza resinaria*, Cke. & Phil., Grevillea, vol. iii. p. 185.

*Lachnella resinaria*, Phil., Brit. Disc., p. 242.

On resin and bark of spruce fir.

Described from specimen in Phillips' Elv. Brit., n. 36.

The size of the spores,  $5 \times 2.5 \mu$ , as given by Phillips in Disc. Brit., is certainly too large. I have never found them above  $3 \mu$  long.

### ***Dasyscypha luzulina*. Mass.**

Ascophores gregarious or scattered, shortly stipitate, at first turbinate, then hemispherical, at length nearly plane; externally white, pubescent; disc pale yellow; margin entire; asci clavate; spores 8, fusiform, straight or slightly curved, biseriate,  $13 \times 3 \mu$ ; paraphyses filiform.

*Peziza luzulina*, Phil., Grev., iv. p. 121.

*Lachnella luzulina*, Phil., Brit. Disc., p. 244.

On dead *Luzula sylvatica*, at the base, between the leaves. Winter.

Unknown to me. I can find no ascophores in the Kew copies of Phil., Elv. Brit., n. 71, said to be this species.

### ***Dasyscypha diminuta*. Sacc., Syll., viii. n. 1870.**

Scattered or crowded, narrowed to a short stem-like base, very minute and thin, globoso-depressed and closed when young, then expanded, up to  $\frac{1}{3}$  mm. across; disc varying from yellow to orange, externally whitish and very minutely downy, hairs exceedingly slender, short, those at the margin cylindrical,  $25-50 \times 2-2.5 \mu$ ; cortex minutely parenchymatous, cells arranged in parallel series; asci very small, cylindric-clavate, 8-spored; spores hyaline, continuous, straight, filiform,  $5-6 \times 1 \mu$ ; 1-seriate below, 2-seriate upwards; paraphyses hyaline, cylindrical, very slender.

*Peziza diminuta*, Roberge, Ann. Sci. Nat., 1847, vol. vii. p. 185.

*Lachnella diminuta*, Phil., Brit. Disc., p. 253?

On dead culms of *Juncus*.

A very minute and delicate species, and when examined after being dried, the long, delicate hairs, said to be present in the living state, are not apparent. Phillips gives the spore measurements as  $12 \times 2 \mu$ , which are certainly much larger than the specimen I have examined, which was sent by Roberge to Berkeley.

B. *Externally coloured.*

† *Paraphyses lanceolate.*

\* *Disc brownish, reddish, or buff.*

**Dasyscypha horridula. Mass.**

Gregarious or scattered, sessile but attached by a point only, hemispherical then expanded, about  $\frac{2}{3}$  mm. across; excipulum thin and delicate, parenchymatous, cells small, slightly elongated radially; densely pilose externally, hairs somewhat spreading, simple or rarely with 1-2 short branches originating at right angles and near the apex, wall thin, rather closely septate, cylindrical, smooth, sometimes wavy; bright brown, becoming colourless towards the tip,  $80-150 \times 5-6 \mu$ ; disc pallid; asci narrowly clavate, 8-spored; spores linear-fusiform, hyaline, smooth, distinctly 1-septate at maturity,  $15-20 \times 1.5 \mu$ , irregularly biseriate; paraphyses lanceolate, apex acute, longer than the asci, about  $4 \mu$  broad at the widest part, hyaline.

*Peziza horridula*, Desm., Ann. Sci. Nat., ser. iii., vol. viii. p. 185.

*Trichopeziza horridula*, Sacc. Syll., viii. n. 1738.

On dry wheat straw.

Specimen in Desmaz., Crypt. France, ser. i., n. 1740, examined.

Very close to *D. canescens*, under which species the two are contrasted.

**Dasyscypha fragariastris. Mass.**

Gregarious, stipitate, firm, cyathiform, faint purplish-red, paler near the margin, clothed with short, hyaline, simple hairs, usually enlarged at the summit; asci subclavate;



spores fusiform or oblong-fusiform,  $5 \times 1-2 \mu$ ; paraphyses acerose, rather stout, somewhat abruptly acuminate.

*Lachnella fragariastris*, Phillips, in Proc. Bristol Nat. Soc., vol. vi. p. 274.

On dead strawberry stems.

Not examined.

***Dasyscypha canescens*. Mass.**

Gregarious or densely crowded, sessile, hemispherical then expanded, thin, up to  $\frac{3}{4}$  mm. across; disc concave, dingy brown (when dry); excipulum parenchymatous, cells irregularly polygonal,  $7-10 \mu$  diameter; densely clothed externally with wavy or straight, cylindrical, obtuse, thin-walled, smooth, septate hairs, clear brown at the base, becoming pale towards the apex,  $50-120 \times 5-7 \mu$ ; asci narrowly cylindric-clavate, 8-spored; spores fusiform, straight or slightly curved, hyaline, smooth, at length becoming 1-septate, irregularly biseriate,  $9-14 \times 1.5-2 \mu$ ; paraphyses very narrowly lanceolate, apex acute,  $3 \mu$  thick at the widest part, slightly longer than the asci, hyaline.

*Lachnella canescens*, Phil., Brit. Disc., p. 259; Sacc., Syll., n. 1620.

On naked wood.

Type specimen examined.

The cups are fawn-colour externally when dry, the hymenium darker.

The present species is allied to *D. horridula*, and will be considered by many as a variety of that species. It is kept distinct more especially on account of the difference of habitat, the spores are also rather smaller, and the hairs more wavy in the present species.

***Dasyscypha albo-testacea*. Mass.**

Scattered, sessile or narrowed to a very short stem-like base, globose and closed when dry, open and exposing the pale flesh-coloured disc when moist, up to  $\frac{2}{3}$  mm. across; excipulum thin and delicate, parenchymatous, cells irregularly polygonal, rather large; externally pilose, hairs straight or slightly wavy, somewhat tapering towards the apex, wall thin, septate, often rough with minute particles of lime,  $80-120 \mu \times 5-6 \mu$ ,  $2 \mu$  thick at the apex, pale reddish brown at the base, becoming colourless towards the



pointed apex; asci narrowly clavate, 8-spored; spores irregularly biseriate, narrowly fusiform, continuous, hyaline, smooth, straight or very slightly curved,  $7-12 \times 1.5 \mu$ ; paraphyses lanceolate, apex acute, half as long again as the ascus, hyaline.

*Peziza albo-testacea*, Desmaz., Ann. Sci. Nat., xix. (1843), p. 368.

*Lachnella albo-testacea*, Phil., Brit. Disc., p. 273.

*Trichopeziza albo-testacea*, Sacc., Syll., viii. n. 1730.

On sheaths and leaves of grasses.

Allied to *D. horridula*, but distinguished by the continuous spores and tapering hairs.

Specimen in Desmazière's Crypt. Fr., ser. i., n. 1415, examined.

***Dasyscypha controversa*.** Rehm, 26 Ber. Naturh. Ver. Augsburg, p. 31; Sacc., Syll., viii. n. 1861.

Gregarious or scattered, shortly stipitate, thin,  $\frac{3}{4}-1\frac{1}{2}$  mm. across; disc pallid, externally pale tawny, villose, marginal hairs thin-walled, cylindrical, obtuse, usually aseptate, pale brown below, tips hyaline, minutely rough, crowded,  $70-100 \times 4-5 \mu$ ; cortical cells irregularly polygonal,  $7-9 \mu$  diameter; asci clavate, apex narrowed, 8-spored; spores 2-seriate, hyaline, continuous, narrowly elliptic-fusiform, straight,  $5-8 \times 1-1.5 \mu$ ; paraphyses lanceolate, apex acute, hyaline,  $4-5 \mu$  broad, half as long again as the asci.

*Peziza controversa*, Cooke, Grev., vol. iv. p. 41, pl. 51, fig. 264.

*Lachnum controversum*, Rehm, Krypt.-Flora, Disc., p. 904.

On dead culms of various grasses.

Allied to *D. palearum*, but differs in the smaller spores and larger cortical cells.

Specimen in Phil., Elv. Brit., n. 70, examined; also Rehm, Ascom., n. 114.

This species is represented in Phil., Elv. Brit., n. 70, by beautiful specimens; its omission from his "British Discomycetes" is probably therefore due to an oversight.

***Dasyscypha palearum*.** Mass.

Scattered, stipitate, subglobose and closed, then expanding, thin,  $\frac{1}{2}-\frac{3}{4}$  mm. across; disc remaining more or less

concave, pallid or whitish, externally pale tawny, tomentose. hairs thin-walled, septate, cylindrical, obtuse, minutely rough, pale clear brown below, tips colourless, minutely rough,  $80-150 \times 5-6 \mu$ ; cortex parenchymatous, cells elongated in the direction from base to apex,  $6-8 \times 3-4 \mu$ ; asci clavate, apex narrowed, 8-spored; spores hyaline, continuous, narrowly elliptic-fusiform, 2-seriate,  $11-14 \times 1.5-2 \mu$ , often guttulate; paraphyses lanceolate, tips acute, half as long again as the asci and nearly as broad at the widest part.

*Peziza palearum*, Desmaz., Ann. Sci. Nat., 1846.

*Lachnella palearum*, Phil., Brit. Disc., p. 239.

*Dasyscypha patens*, Sacc., Syll., viii. n. 1942.

On straw of wheat and other grasses.

Allied to *D. controversa*, but separated by the longer spores and smaller, narrower cortical cells.

Rehm—Krypt. Flora, Disc., p. 905—calls the present species *Dasyscypha patens*, considering it to be *Peziza clandestina*  $\beta$  *patens* of Fries, Syst. Myc., ii. p. 64.

***Dasyscypha fuscescens*.** Rehm, 26 Ber. Naturh. Ver. Augsb., p. 111, 112.

Scattered, shortly stipitate, globose and closed at first, then expanding until quite plane, thin, up to 1 mm. broad; disc whitish or pallid, externally pale brown, villose, marginal hairs best developed, thin-walled, septate, cylindrical, obtuse, dingy brown, tips pale and usually bearing an amorphous lump of oxalate of lime,  $80-150 \times 5-6 \mu$ ; cortical cells brownish, irregularly polygonal,  $6-9 \mu$  diameter; asci clavate, apex slightly narrowed, 8-spored; spores hyaline, continuous, 2-seriate, elliptic-fusiform,  $6-9 \times 2 \mu$ ; paraphyses lanceolate, tips acute, about half as long again as the asci,  $4-5 \mu$  across at the broadest part.

*Peziza brunneola*, Desmaz., Ann. Sci. Nat., 1841, p. 96.

*Lachnella brunneola*, Phil., Brit. Disc., p. 238.

*Lachnella brunneola*, var. *fagicola*, Phil., Brit. Disc., p. 238.

*Dasyscypha brunneola*, Sacc., Syll., viii. n. 1916.

*Peziza fuscescens*, Pers., Syn. Fung., p. 654.

*Lachnella fuscescens*, Phil., Brit. Disc., p. 235.

*Lachnum fuscescens*, Rehm, Krypt.-Flora, Disc., p. 900.

On the underside of fallen leaves of oak and beech, also on beech mast.

Specimens in Desm., Crypt. France, n. 1156; Phil., Elv. Brit., n. 28; Fuckel, Fung. Rhen., n. 1168; and Roumg., Fung. Gall., no. 1959, examined.

I do not know what species Phillips had in view when describing his *Lachnella fuscescens*—Brit. Disc., p. 235—which is said to differ from his *L. brunneola* in having filiform paraphyses—l.c., p. 238—but the paraphyses are distinctly lanceolate and acute, and the specimens altogether identical with *D. fuscescens* as described above, in both the exsiccati quoted by Phillips under his *L. fuscescens*.

*Dasyscypha calyculaeformis*. Rehm, Ascom., n. 207; Sacc., Syll., viii. n. 1888.

Scattered or gregarious, stipitate, funnel-shaped, at first closed, then expanding until the margin is erect, up to 2 mm. high and broad; disc yellowish-brown; externally brown, villose as is also the short stout stem, hairs longest at the margin, where they are thin-walled, septate, cylindrical, yellow-brown, usually minutely rough, straight or slightly wavy,  $80-150 \times 6-8 \mu$ ; cortex formed of slender, septate, parallel hyphae; asci cylindric-clavate, 8-spored; spores 2-seriate, hyaline, continuous, linear-fusiform, straight,  $10-12 \times 2 \mu$ ; paraphyses lanceolate, apex acute, hyaline,  $4-5 \mu$  at widest part, longer than the asci.

*Peziza calyculaeformis*, Schum., Enum, pl. Saell., p. 425.

*Lachnella calyculaeformis*, Phil., Brit. Disc., p. 237.

*Lachnum calyculaeformis*, Karst., Myc. Fenn., i. p. 178; Rehm, Krypt.-Flora, p. 897, figs. 1-4, p. 866.

On branches of hazel, alder, &c.

Very near to *D. clandestina*, but the ascophore is altogether larger, and the spores and marginal hairs longer. The stem is blackish-brown and smooth when the hairs have fallen away.

Specimen in Rehm's Ascom., n. 207, examined.

*Var. latebricola*, Rehm, Ascom., n. 111; Phil., Brit. Disc., p. 237.

Spores elliptical,  $6-8 \times 2.5 \mu$ ; some of the paraphyses are filiform, others lanceolate and acute, and longer than the asci.

On fallen branches of *Rhododendron ferrugineum* and *Vaccinium uliginosum*.

Phillips found the spores  $9-10 \times 2.5 \mu$ .

Specimen in Rehm, Ascom., n. 111A, examined.

***Dasyscypha clandestina*.** Fekl., Symb. Myc., p. 305.

Usually closely gregarious, stipitate, turbinate and closed when young, then saucer-shaped, margin erect,  $\frac{1}{2}$ -1 mm. broad; disc pallid, often becoming brownish, externally fawn-colour or brown, villose, as is also the short, stout stem, hairs best developed at the margin, thin-walled, septate, obtuse or a little thickened at the tips, which often bear crystals, usually also minutely rough, yellow-brown, tips pale,  $80-100 \times 6-7 \mu$ ; cortex composed of parallel, slender, septate hyphae; asci cylindric-clavate, 8-spored; spores hyaline, continuous, straight, linear-fusiform, 2-seriate,  $6-8 \times 1.5 \mu$ ; paraphyses hyaline, lanceolate, apex acute,  $5-6 \mu$  at the broadest part, longer than the asci.

*Peziza clandestina*, Bull., Hist. Champ. France, p. 251, t. 416, f. 5.

*Lachnella clandestina*, Phil., Brit. Disc., p. 236.

*Dasyscypha albofurfuracea*, Sacc., Syll., viii. n. 1906.

*Lachnella caulicola*, Phil., Brit. Disc., p. 236.

On dry stems of *Rubus idaeus*.

Allied to *D. calyculaeformis*; for distinguishing features see under last-named.

Specimens examined in Phil., Brit. Elv., n. 67, and Rehm, Ascom., n. 61.

There is no certain evidence of the occurrence of *Peziza caulicola* (= *Lachnella caulicola*, Phil., Brit. Disc., p. 236) in Britain; the specimen in Herb. Berk., Kew, from Rudlow, accepted by Phillips as this species, proves on examination to be typical *Dasyscypha clandestina*.

***Dasyscypha nidulus*.** Mass.

Scattered or gregarious, sessile, depresso-globose and closed at first, becoming nearly plane, firm,  $\frac{1}{2}$ - $\frac{3}{4}$  mm. across; disc pallid-yellow, externally chestnut-colour, pilose, hairs spreading, cylindrical, obtuse, rather thick-walled, many-septate, smooth, straight, brown, tips paler, crowded,

70–150  $\times$  6–8  $\mu$ ; cortex parenchymatous, cells irregularly polygonal, 5–7  $\mu$  diameter; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores hyaline, continuous, 2-seriate, elliptic-fusiform, 6–12  $\times$  1.5–2  $\mu$ , straight; paraphyses lanceolate, acute, hyaline, longer than the asci.

*Peziza nidulus*, Schmidt & Kunze, Crypt. Germ., exs., n. 72.

*Lachnella nidulus*, Phil., Brit. Disc., p. 264.

*Trichopeziza nidulus*, Sacc., Syll., viii. n. 1682.

On dead stems of *Convallaria multiflora*, *C. verticillata*, and on meadow-sweet.

Distinguished by the stout, cylindrical, brown, rather closely septate external hairs.

Specimen in Kze. & Schm., Crypt. Germ., n. 72.

**\*\* Externally yellow.**

### ***Dasyscypha leucophaea*. Mass.**

Usually gregarious, sessile but narrowed at the base, globose and closed at first then plane, the margin slightly raised, 1–2 mm. across; disc pallid or tinged with rose-colour, externally sulphur-yellow, densely villose, hairs cylindrical, more or less pointed, septate, straight, pale yellow, rough with minute lumps of lime, 150–180  $\times$  4–5  $\mu$ ; cortical cells irregularly polygonal, 5–7  $\mu$  diameter; asci narrowly cylindric-clavate, 8-spored; spores hyaline, continuous, narrowly elliptic-fusiform, straight or slightly curved, 2-seriate, 12–18  $\times$  2–2.5  $\mu$ ; paraphyses lanceolate, acute, longer than the asci, hyaline, 4–5  $\mu$  at the widest part.

*Peziza sulfurea*, var. *leucophaea*, Pers., Myc. Eur., i. p. 250.

*Lachnum leucophaeum*, Rehm, Krypt.-Flora, Disc., p. 890, figs. 1–4, p. 865.

On stems of herbaceous plants.

For distinguishing features between the present, *Erinella Nylanderii* and *D. sulfureum*, see note under last-named species.

For the clearing up of the previous confusion of the three above-named species, we are indebted to the excellent work by Dr. Rehm—Rabenhorst's Kryptogamen-Flora, Discomycetes.

Specimen examined in Rehm's Ascom., n. 65A, also Sydow, Myc. March, no. 1364.

***Dasyscypha sulfurea*. Mass.**

Ascophores scattered, sessile but narrowed at the base, closed at first, becoming plane, margin slightly raised, up to 1.5 mm. broad, externally densely villose, sulphur-yellow, hairs crowded, straight, septate, cylindrical, rather pointed or obtuse, rough with minute lumps of lime, pale greenish-yellow or sometimes pale yellowish-brown,  $150-200 \times 5 \mu$ ; cortex parenchymatous, cells irregularly polygonal,  $5-6 \mu$  diameter; the hairs and tissue of excipulum and cortex become violet-colour with potassic hydrate; asci clavate, 8-spored; spores elliptic-fusiform, continuous, hyaline, straight or slightly bent, 2-seriate,  $8-10 \times 1.5-2 \mu$ ; paraphyses lanceolate, acute, longer than the asci, hyaline,  $4-5 \mu$  broad at the widest part.

*Peziza sulfurea*, Pers., Tent. Disp. Meth., p. 33.

*Lachnum sulfureum*, Rehm, Krypt.-Flora, Disc., p. 891.

On dead stems of herbaceous plants.

We have in Britain three distinct species which have hitherto been included under the name of *Peziza sulfurea*, Persoon. The present, distinguished from *D. leucophaea* by the smaller spores, and by the substance of the excipulum and external hairs being coloured violet by a solution of potassic or ammoniac-hydrate. Finally *Erinella Nylanderii* is distinguished from both the preceding by the much larger, multiseptate spores.

***Dasyscypha cerina*. Fekl., Symb. Myc., p. 305; Sacc., Syll., viii. n. 1887.**

Gregarious or crowded, narrowed into a very short stem-like base, or quite sessile, margin incurved and closed when young, then expanding, 1-2 mm. across; everywhere waxy-yellow, often with a tinge of olive; externally and the margin villose, hairs thin-walled, septate, cylindrical, obtuse, usually slightly wavy,  $150-200 \times 5-6 \mu$ ; rough externally with particles of lime; cortical cells  $6-8 \mu$  diameter; asci narrowly clavate, 8-spored; spores irregularly 2-seriate, smooth, hyaline, continuous, elliptical,  $6 \times 2.5-3 \mu$ ; paraphyses slender, narrowly lanceolate and acute, rather longer than the asci.

*Peziza cerina*, Pers., Syn. Fung., p. 651.

*Lachnella cerina*, Phil., Brit. Disc., p. 233., pl. vii., fig. 44.

On rotten wood.

Readily known at sight by the gregarious, dull olive-yellow or wax-coloured, villose ascophores.

Specimen in Kew Herb. named by Persoon, examined.

***Dasyscypha pygmaea*.** Sacc., Syll., viii. n. 1816.

Gregarious or caespitose, stipitate, turbinate and closed when young, then hemispherical, finally becoming plane, 4–6 mm. across; disc orange, externally paler, downy, hairs short; thin-walled, 1–2-septate, obtuse, minutely rough,  $30\text{--}45 \times 4 \mu$ , crowded; cortical cells parenchymatous, elongated in the direction from base to margin,  $6\text{--}8 \times 3\text{--}4 \mu$ ; stem 3–5 mm. high, cylindrical or expanding upwards, sometimes branched, each branch bearing an ascophore, minutely downy; asci narrowly clavate, apex narrowed, 8-spored; spores 2-seriate, narrowly cylindric-fusiform, continuous, hyaline,  $10\text{--}11 \times 2\text{--}2.5 \mu$ ; paraphyses lanceolate, apex acute, rather longer than the asci, about  $4 \mu$  at the broadest part.

*Peziza pygmaea*, Fr., Syst. Myc., ii. p. 79.

*Lachnella pygmaea*, Phil., Brit. Disc., p. 242.

On wood among moss, also on partly buried branches (furze) &c.

A large species, but variable in size and length of stem, which is sometimes proliferous or branched. The disc is also sometimes proliferous, bearing smaller ascophores on its surface, as shown in the figures by Berkeley and Broome—Linn. Trans., xxv. p. 432, t. 55, figs. 7–13.

Specimen in Herb. Berk., Kew, accepted as typical.

**\*\* *Paraphyses cylindrical*.**

**\* *Externally clear deep or pale yellow*.**

***Dasyscypha melaxantha*.** Mass.

Gregarious, narrowed at the base or broadly sessile, closed at first, then expanding, but the margin remaining erect,



contracted when dry, thin, up to 1 mm. across; disc black, externally clear greenish-yellow, or sometimes almost sulphur-yellow, pilose, the hairs often arranged in vertical lines, thin-walled, usually continuous, straight, base rather venticose and running out into a long, slender point, faintly tinged yellow,  $40-65 \times 3-4 \mu$ , crowded; cortex minutely parenchymatous; asci small, clavate, apex slightly narrowed, base stout, 8-spored; spores 2-seriate, elliptic-oblong, continuous, hyaline,  $5-7 \times 1.5-2 \mu$ ; paraphyses very slender, hyaline, cylindrical.

*Peziza melaxantha*, Fries, Syst. Myc., ii. p. 97.

*Lachnella melaxantha*, Phil., Brit. Disc., p. 266.

*Trichopeziza melaxantha*, Sacc., Syll., viii. n. 1772.

On branches of beech, &c.

An exceptionally well marked, and distinct species, known at once by the black disc and yellow exterior.

Specimen in Herb. Berk., Kew, collected by the late Captain Carmichael, accepted as typical.

***Dasyscypha pulverulenta*.** Sacc., Syll., viii. n. 1928.

Scattered, narrowed into a very short, stem-like base, entirely citron-yellow, thin,  $\frac{1}{2}-\frac{3}{4}$  mm. across; externally villose, hairs longest at the margin, thin-walled, septate, cylindrical, obtuse, hyaline, minutely rough with particles of lime, and usually tipped with an amber-coloured mass of resin,  $50-80 \times 3-4 \mu$ ; asci narrowly clavate, 8 spored; spores hyaline, smooth, continuous, narrowly elliptical,  $5-7 \times 1 \mu$ ; paraphyses hyaline, slender, cylindrical.

*Peziza pulverulenta*, Lib., Crypt. Ard., n. 125.

*Peziza solfatera*, Cke. & Ellis, Grev., vii. p. 7.

*Lachnella solfatera*, Phil., Brit. Disc., p. 246.

*Dasyscypha solfatera*, Sacc., Syll., viii. n. 1929.

When fresh the entire fungus is clear lemon-yellow, the resin from the matrix passes up the lumen of the hairs and exudes as an amber-coloured drop at the apex, which hardens when it comes in contact with the air. When these resin-tipped hairs are abundant the exterior of the ascophore is amber-colour, especially near the margin.

The type specimen of *Peziza solfatera*, Cke. & Ellis, on examination proves to be identical with *Peziza pulverulenta*,

Lib., Crypt. Ard., n. 125, as do also the British specimens from Carlisle.

***Dasyscypha comitessae*.** Sacc., Syll., viii. n. 1832.

Ascophores caespitose, gregarious, or scattered, stipitate, clavate and closed at first, then expanded, 2–3 mm. across; disc bright golden-yellow, externally pale yellow and minutely tomentose, hairs cylindrical, obtuse, thin-walled, septate, minutely rough, very faintly tinged yellow,  $40-70 \times 4-5 \mu$ ; cortical cells irregularly polygonal, 6–8  $\mu$  diameter; stem 2–3 mm. long, expanding upwards; as a rule the stem branches into 3–4 portions at the base, each branch bearing an ascophore; asci cylindric-clavate, apex narrowed, base or pedicel short, stout, 8-spored; spores 2-seriate, hyaline, continuous, elliptical, ends often rather acute,  $6-7 \times 2.5 \mu$ ; paraphyses hyaline, slender, cylindrical.

*Peziza comitessae*, Cke., Grev., iv. p. 111.

*Lachnella comitessae*, Phil., Brit. Disc., p. 243.

On bark of a fallen tree (alder?).

Agreeing in colour and in the branching stem with *D. pygmaea*, but differs in having very slender, cylindrical paraphyses not longer than the asci. When dry the fungus is almost white externally, and superficially resembles *D. calycina* and *D. resinaria*, but differs in not growing on conifers, also in the spores.

Type specimen examined.

***Dasyscypha puberula*.** Mass.

Scattered or gregarious, sessile but narrowed into a very short, stem-like base, closed and almost globose at first, then becoming almost or quite plane, very thin and delicate, very pale yellow or whitish, about  $\frac{1}{2}$  mm. across; externally and the margin pubescent, hairs cylindrical, obtuse, 1–2-septate  $8-15 \times 3-4 \mu$ , colourless, thin-walled; cortex parenchymatous, cells irregularly polygonal, 5–7  $\mu$  diameter; asci clavate, tip narrowed, pedicel elongated, rather stout, often crooked, 8-spored; spores irregularly 2-seriate, hyaline, smooth, continuous, narrowly elliptic-fusiform, straight,  $8-11 \times 3-3.5 \mu$ ; paraphyses slender, cylindrical, same length as the asci, hyaline.

*Peziza puberula*, Lasch, in Klotzsch, Herb. Myc., n. 1529 (a specimen examined).

*Lachnella puberula*, Phil., Grev., xviii. p. 85.

*Pseudohelotium puberulum*, Sacc., Syll., viii. n. 1253.

On fallen, decaying leaves of oak, &c.

The present species is intermediate between *Dasyscypha* and *Helotium*, the external and marginal hairs being minute, at the same time quite distinct.

### ***Dasyscypha stereicola*. Mass.**

Gregarious, narrowed below into a short, stem-like base, at first turbinate then expanding and becoming cup-shaped, soft and rather fleshy,  $\frac{1}{2}$ –1 mm. across, orange with a tinge of rose, especially when dry, externally and the margin downy; excipulum minutely parenchymatous, cortical cells irregularly polygonal, minute, becoming narrow and elongated towards the margin, and running out into thin-walled, hyaline, septate, obtuse hairs, externally rough with minute particles of lime,  $30\text{--}50 \times 4\text{--}6 \mu$ , becoming shorter and less numerous downwards; asci cylindric-clavate, apex slightly narrowed, base rather stout, 8-spored; spores irregularly 2-seriate, continuous, smooth, hyaline, elliptic-oblong, ends obtuse,  $6\text{--}8 \times 1.5\text{--}2 \mu$ ; paraphyses slender, tip very slightly or not at all thickened.

*Peziza stereicola*, Cooke, Grev., vol. i. p. 130.

*Calloria stereicola*, Phil., Brit. Disc., p. 328.

*Trichopeziza stereicola*, Sacc., Syll., viii. n. 1750.

On the hymenium of species of *Stereum*.

Type specimen examined, also specimen in Phil., Elv. Brit., n. 186.

### ***Dasyscypha citricolor*. B. & Br.**

Cups very shortly stipitate or sessile, between waxy and fleshy, turbinate, finely tomentose, citron-colour; asci clavate; spores fusiform, dotted with oil drops,  $20\text{--}25 \times 5\text{--}6 \mu$ ; paraphyses linear.

*Peziza (Dasyscypha) citricolor*, B. & Br., Ann. Nat. Hist., n. 1321, t. xix., fig. 14.

*Lachnella citricolor*, Phil., Brit. Disc., p. 260.

On rotten wood.

Unknown to me. There is no specimen of the present species in Berkeley's herbarium.

\*\* *Externally brown, red, buff, or dingy.*

§ *Growing on dead herbaceous stems or leaves.*

***Dasyscypha oedema.* Mass.**

Gregarious, sessile but fixed by a narrow base, globose then expanding, up to  $\frac{1}{5}$  mm. across, altogether greyish-white, soft and somewhat tremellose; excipulum very thin and delicate, parenchymatous, cells irregularly polygonal, rather large; externally minutely pubescent, hairs colourless, septate, thin-walled, cylindrical or very slightly thickened at the apex, often minutely rough,  $50-75 \times 4 \mu$ ; asci clavate, often curved, 8-spored; spores irregularly biseriate, fusiform, continuous, hyaline,  $6-10 \times 1.5-2 \mu$ ; paraphyses scanty, filiform, hyaline.

*Peziza oedema*, Desm., Ann. Sci. Nat., 1850, p. 4.

*Lachnella oedema*, Phil., Brit. Disc., p. 271.

*Trichopeziza oedema*, Sacc., Syll., viii. n. 1751.

Parasitic on clusters of *Phragmidium*, on the under side of bramble leaves.

Care must be taken not to confound the present species with *D. dumorum*, which often accompanies it on the bramble leaves.

Specimen in Desm., Crypt. France, ser. i. n. 2007, examined.

***Dasyscypha dumorum.* Mass.**

Scattered, sessile, but narrowed at the base, turbinate and closed, then plane, about  $\frac{1}{4}$  mm. across; disc white or with a yellow tinge, externally dark brown, villose, hairs cylindrical, tips rather pointed, usually aseptate, dark brown and almost opaque,  $40-50 \times 3-4 \mu$ , crowded; asci small, cylindric-clavate, 8-spored; spores 2-seriate, hyaline, continuous, narrowly elliptic-fusiform,  $4.5 \times 1 \mu$ ; paraphyses subcylindrical, slender, not longer than the axis.

*Peziza dumorum*, Roberge, Ann. Sci. Nat., 1850, vol. xiv.

*Peziza lucifuga*, B. & Br., in Herb. Berk.

*Lachnella dumorum*, Phil., Brit. Disc., p. 261.

*Trichopeziza dumorum*, Sacc., Syll., viii. n. 1727.

On the under surface of dead bramble leaves.

Near to *D. nidula*, but differs in the smaller asci and spores,

and in the external hairs being altogether smaller, without evident septa, not rough, and not paler and thickened at the tip.

Specimen in Herb. Berk., from Roberge, examined, also the specimen called *Peziza lucifuga*, B. & Br.

***Dasyscypha trichodea*. Sacc., Syll., n. 1927.**

Gregarious or scattered, somewhat erumpent, narrowed at the base, globose and closed at first, then hemispherical, margin usually erect; disc pallid or whitish, externally pale yellowish brown, villose, hairs more or less tufted at the margin, rather rigid, subcylindrical, mostly aseptate, often thickened at the base, yellowish brown,  $60-100 \times 4-5 \mu$ ; cortical cells small; from  $\frac{1}{4}$ –13 mm. across; asci small, narrowly clavate, 8-spored; spores 2-seriate, hyaline, smooth, colourless, continuous, elliptical,  $5-7 \times 1.5 \mu$ , often biguttulate; paraphyses hyaline, very slender, cylindrical.

*Peziza trichodea*, Phil. & Plow., Grev., 111, p. 125, pl. 42, fig. 4.

*Lachnella trichodea*, Phil., Brit. Disc., p. 234.

On dead pine leaves.

Specimen in Phil., Elv. Brit., n. 69, examined.

***Dasyscypha Berkeleyi*. Mass.**

Gregarious, sessile, at first globose and closed, then expanded and hemispherical, up to  $\frac{1}{2}$  mm. across; excipulum parenchymatous, the cells near the margin being irregularly polygonal, slightly elongated radially,  $7-11 \mu$  broad, gradually becoming longer and narrower towards the base; externally dingy ochraceous, densely clothed, especially at the margin with delicate, perfectly cylindrical, septate, smooth, colourless hairs not at all thickened at the apex,  $40-80 \times 4 \mu$ ; hymenium pale yellowish-brown; asci cylindric-clavate, apex narrowed, 8-spored; spores irregularly biseriate, cylindric-fusiform, smooth, colourless, continuous,  $6-9 \times 2 \mu$ ; paraphyses filiform, about  $2 \mu$  thick, apex not thickened, hyaline.

*Peziza Berkeleyi*, Bloxam, in Berk. & Broome, Brit. Fung., Ann. Nat. Hist., n. 770.

*Lachnella Berkeleyi*, Phil., Brit. Disc., p. 270.

*Trichopeziza Berkeleyi*, Sacc., Syll., viii. n. 1673.

On dead stems of umbellifers.

Closely allied to *D. Grevillei*; points of difference are noted under the last named.

***Dasyscypha Grevillei*. Mass.**

Ascophores scattered or gregarious, but more or less narrowed at the base, about  $\frac{1}{3}$  mm. across, at first closed, then hemispherical, every part varying from dingy ochraceous to pale brown; excipulum parenchymatous, the cells very narrow,  $3-4\ \mu$ , and much elongated radially; externally pilose, hairs most abundant and longest at the dentate margin, the teeth consisting of clusters of slender, colourless hairs,  $30-40 \times 3-4\ \mu$ , apex clavate or pyriform,  $6-8\ \mu$  thick, rough with minute particles of lime; asci cylindric-clavate, apex narrowed, 8-spored; spores irregularly biseriate, cylindric-fusiform, straight or very slightly curved, hyaline continuous,  $2-3$ -guttulate,  $6-9 \times 2\ \mu$ ; paraphyses filiform, about  $2\ \mu$  thick, apex not thickened, colourless.

*Peziza Grevillei*, Berk., Engl. Flora, vol. v. p. 198.

*Mollisia Grevillei*, Phil., Brit. Disc., p. 180.

*Trichopeziza Grevillei*, Sacc., Syll., viii. n. 1674.

On dead stems of umbellifers.

Very closely allied to, and also very closely resembling *D. Berkeleyi*; differing in the much shorter and distinctly clavate marginal hairs, and in the much smaller and narrower cells of the excipulum near its margin.

***Dasyscypha prasina*. Mass.**

Gregarious or crowded, sessile, at first hemispherical, then expanded, becoming nearly plane, thin, waxy, soft, olive-brown, clothed with bright, rufous, slender, flexuous hairs, bright red below, colourless in the upper portion, margin incurved, about  $\frac{3}{4}$  mm. across; disc greyish bistre or green, at length pale grey; asci cylindraceo-clavate; spores 8, fusiform straight or curved,  $10-15 \times 2-3\ \mu$ ; paraphyses filiform.

*Lachnella prasina*, Quelet, Assoc. Franc., 1880, p. 13, t. ix., fig. 5; Phil., Brit. Disc., p. 261.

*Trichopeziza prasina*, Sacc., Syll., viii. n. 1732.

On dead culms of *Phalaris arundinacea* in water or very damp places. Summer.

Not examined.



**Dasyscypha micacea.** Mass.

Scattered or gregarious, very minute, sessile, expanded, extremely tender; externally farinoso-tomentose, pale red or dilute cinnamon; disc the same colour; asci cylindracco-clavate; spores 8, fusiform,  $3-5 \times 1 \mu$ ; paraphyses slenderly filiform.

*Peziza micacea*, Pers., Myc. Eur., p. 268.

*Lacknella micacea*, Phil., Brit. Disc., p. 269.

On dead stems of thistle.

Ascophores about  $200-300 \mu$  broad. The hairs of the exterior are short, slender, and deciduous.

Unknown to me. A species respecting which there is a considerable difference of opinion, and must ever be, as no type specimen exists, and from the brief description given by Persoon, I consider it is absolutely impossible to ascertain exactly the species he had in view. The above description is from Phillips, and describes the species considered by him to be Persoon's fungus.

§§ *Growing on bark, wood, or branches.*

**Dasyscypha corticalis.** Mass.

Gregarious, sessile, but attached by a narrow base, globose then hemispherical and expanded, up to  $\frac{2}{3}$  mm. across; excipulum thin, parenchymatous, irregularly polygonal, becoming very narrow and radially elongated before passing into the marginal fringe; disc pale with slight red or brown tinge; externally densely pilose, hairs best developed at the margin, where they are very numerous and of irregular lengths, cylindrical or tapering to the end very slightly, walls thin, septate, straight or slightly curved sometimes, smooth, or minutely rough with fine particles of lime, sometimes a large, irregular lump of lime occurs at the apex, or binds 2-3 hairs together, pale brown at the base becoming paler at the apex, or altogether almost colourless.  $50-80 \times 3-4 \mu$ ; asci clavate, usually with an oblique pedicel with a knob at the end, 8-spored; spores irregularly biserial, narrowly fusiform, the widest part above the middle of the spore, or the apex thickened and rounded, straight or usually slightly bent, hyaline, 3-4-guttulate and at first continuous,



finally 1-septate,  $16-20 \times 3.5-4 \mu$ ; paraphyses slender, cylindrical,  $2-3 \mu$  thick, apex not thickened, hyaline, slightly longer than the asci.

*Peziza corticalis*, Pers., Disp. Meth. Fung., p. 34.

*Lachnella corticalis*, Fries, Summa Veg. Scand., p. 365; Phil., Brit. Disc., p. 258; Rehm, Krypt.-Flora, Disc., p. 885.

On dead bark of trees, poplar, &c.

Specimens in Kunze, Fung. Sel. Exs., n. 562, and Phil., Elv. Brit., n. 112, examined.

Distinguished from closely allied species by the large fusiform spores having the widest part above the middle, and by the slender, pale or colourless hairs, also by habitat.

### ***Dasyscypha barbata*. Mass.**

Gregarious, sessile, depresso-globose and closed at first, finally nearly plane but slightly marginate, firm,  $1-1.5 \text{ mm.}$  across; disc pallid, externally brownish, tomentose, hairs best developed at the margin, thin-walled, septate, smooth, cylindrical, obtuse or slightly swollen at the apex, rusty-brown,  $150-250 \times 4-5 \mu$ ; cortex parenchymatous, cells irregularly polygonal,  $5-7 \mu$  diameter; asci cylindric-clavate, 8-spored; spores irregularly 1-seriate, or 2-seriate upwards, narrowly clavate, ends blunt, 2-guttulate, at length 1-septate,  $9-12 \times 2-2.5 \mu$ ; paraphyses cylindrical, hyaline,  $3-4$  thick, rather pointed and usually rough at the tips, longer than the asci.

*Peziza barbata*, Kunze, in Fries, Syst. Myc., ii. p. 99.

*Lachnella barbata*, Phil., Brit. Disc, p. 263?; Sacc., Syll., viii. n. 1616; Rehm, Krypt.-Flora, Disc., p. 854.

On dead stems of honeysuckle, *Clematis*, &c.

Readily distinguished among the brown species by the stout, cylindrical paraphyses, which are longer than the asci.

Specimens examined in Fries' Scler. Suec., n. 333, and Rehm's Ascom., n. 16.

### ***Dasyscypha papillaris*. Mass.**

Gregarious or scattered, sessile, depresso-globose and closed at first, then becoming plane, slightly narrowed towards the base, contracted when dry, whitish or pale straw-colour, externally pilose, margin very minutely denticulate, due to the presence of slender, almost cylindrical, straight or slightly

wavy, slightly thick-walled, septate hairs, clear brown at the base, becoming almost colourless upwards, sometimes with crystalline granules at the tip,  $80-150 \times 4-6 \mu$ ; cortex parenchymatous, cells irregularly polygonal or almost circular, brownish,  $6-8 \mu$  diameter; asci narrowly clavate, apex slightly narrowed, pedicel stout, 8-spored; spores irregularly 2-seriate, hyaline, smooth, at first continuous, then 1-septate, narrowly elliptic-fusoid, straight or curved,  $12-18 \times 3 \mu$ ; paraphyses slender, hyaline, cylindrical.

*Peziza papillaris*, Bull., Champ., t. 467, f. 1.

*Lachnea papillaris*, Phil., Brit. Disc., p. 257.

*Lachnella varicolor*, Phil., Brit. Disc., p. 259.

On rotten wood.

Specimens in Sacc., Myc. Ven., 1508, examined, also specimens from Montagne in Herb. Berk., Kew.

Whatever the *Peziza varicolor* of Fries may be, I know not, but it is evident that the plant described by Phillips—Brit. Disc., p. 259—under this name is identical with *L. papillaris* of the same work—p. 257—and it will be observed that Phillips has given the same quotation from Fries under both species.

### ***Dasyscypha flammea*. Mass.**

Gregarious, sessile, subglobose and closed when young, becoming expanded, substance thin, dry, usually impregnated with particles of lime, 2–3 mm. diameter, everywhere bright red, becoming dull red with age; externally and the margin densely clothed with thin-walled, cylindrical, obtuse, straight or more or less wavy, pale reddish-brown hairs, which are usually rough with adhering particles of lime,  $80-160 \times 4-5 \mu$ ; asci clavate, apex obtuse, 8-spored; spores irregularly 2-seriate, hyaline, straight or slightly bent, narrowly elliptical, ends obtuse, sometimes becoming 1-septate,  $9-14 \times 3-3.5 \mu$ ; paraphyses slender, cylindrical throughout.

*Peziza flammea*, Albert. & Schw., Comp. Fung. Agro. Nisk., p. 319, tab. 1, fig. 6.

*Lachnella flammea*, Phil., Brit. Disc., p. 407; Sacc., Syll., viii. n. 1615.

On dry, decorticated branches of willow, privet, &c.

Readily distinguished by the red colour of every part, and the densely hairy exterior.

Specimens examined in Phil., Elv. Brit., n. 72; Rehm, Ascom., n. 418, and Fries, Scler., n. 332.

***Dasyscypha spadicea*. Mass.**

Ascophores scattered, sessile, base somewhat narrowed, subglobose and closed at first, then expanding, but the margin remaining erect or slightly incurved, rather dry and tough,  $\frac{1}{2}$ – $\frac{3}{4}$  mm. broad, disc pale bay, externally somewhat darker, and along with the margin, very shortly but densely tomentose, hairs tinged brown, septate, generally wavy, thin-walled, obtuse,  $40$ – $60 \times 3$ – $4 \mu$ ; hypothecium and excipulum formed of slender, intricately interwoven hyphae, which pass directly into the external tomentum; asci narrowly cylindric-clavate, apex slightly narrowed, pedicel stout, 8-spored, spores irregularly 2-seriate, smooth, hyaline, continuous, narrowly elliptic-fusoid,  $8$ – $10 \times 2.5$ – $3 \mu$ ; paraphyses slender, hyaline, cylindrical.

*Peziza spadicea*, Pers., Myc. Eur., p. 252,

*Lachnella spadicea*, Phil., Brit. Disc., p. 258; Sacc., Syll., viii. n. 1623.

On furze, poplar, and lime branches.

Specimen in Herb. Berk., Kew, on furze, from Scotland, accepted as typical. Differs from the structure of *Dasyscypha* in having the hypothecium and excipulum formed of interwoven hyphae.

***Dasyscypha Carmichaeli*. Mass.**

Gregarious; sessile or narrowed to a very short, stem-like base; turbinate then expanding, up to  $\frac{2}{3}$  mm. across, very pale brown, rather fleshy; excipulum minutely parenchymatous; externally rather densely covered with very short, blunt, 2–3-septate, slightly curved hairs, which form a slightly irregularly fringed, whitish margin,  $40$ – $60 \times 5$ – $6 \mu$ ; asci cylindric-clavate, 8-spored; spores irregularly biserial, oblong-fusiform, straight or slightly curved, hyaline, continuous,  $6$ – $8 \times 1.5 \mu$ ; paraphyses filiform, about  $1.5 \mu$  thick, hyaline.

*Peziza grisea*, Carmichael in Herb.

*Lachnella grisella*, Cke. & Phil., Brit. Disc., p. 260.

On decayed decorticated wood.

Type specimen examined.

The margin of the ascophore is incurved when dry. The

short, densely set, very slightly coloured hairs give the exterior of the ascophore a minutely scurfy appearance under a lens. I have not observed the "perpendicularly striate" appearance described by Phillips very distinctly, and in some specimens not at all.

The original specific name is antedated by Rehm.

***Dasyscypha tricolor*. Mass.**

Gregarious or scattered, narrowed into a very short stem-like base, at first closed, then hemispherical, closed when dry, waxy, 1-2 mm. across; disc yellowish, externally bluish grey and villose, hairs thin-walled, septate, cylindrical, obtuse, slightly tinged grey, apex almost colourless,  $80-120 \times 5-6 \mu$ , sometimes rather wavy; cortical cells small, arranged more or less in parallel rows; asci clavate, apex somewhat narrowed, 8-spored; spores hyaline, continuous, often guttulate, narrowly elliptical,  $12-15 \times 2.5-3 \mu$ , 2-seriate; paraphyses slender, cylindrical, slightly longer than the asci.

*Peziza tricolor*, Sow., Eng. Fung., t. 369, f. 6.

*Lachnella tricolor*, Phil., Brit. Disc., p. 240.

On old bark and wood.

Distinguished by the bluish-grey exterior and yellowish disc. Specimen in Moug. & Nest., n. 1189, examined.

***Dasyscypha Stevensoni*. Sacc., Syll., n. 1889.**

Gregarious or scattered, narrowed to a short stem-like base, subglobose and closed at first, then hemispherical, about  $\frac{1}{2}$  mm. across; disc pallid, externally minutely villose, very pale amber, "sugar-colour," hairs dense, slender, thin-walled,  $20-30 \times 3 \mu$ , almost colourless; cortex minutely parenchymatous, asci narrowly clavate, apex slightly narrowed, 8-spored; spores hyaline, continuous, straight, elliptic-fusiform,  $7-8 \times 1.5-2 \mu$ ; paraphyses hyaline, very slender, cylindrical.

*Peziza (Mollisia) Stevensoni*, B. & Br., Ann. Nat. Hist., n. 1485.

*Lachnella Stevensoni*, Phil., Brit. Disc., p. 235.

On decorticated wood.

Type specimen examined.

***Dasyscypha dematiicola*. Mass.**

Scattered or gregarious, sessile, at first globose and closed, then hemispherical, finally plane, but with a distinct margin,

$\frac{1}{2}$ – $\frac{3}{4}$  mm. across; disc greyish, externally brownish with an olive tinge, minutely pilose, hairs, thin-walled, septate, cylindrical, obtuse, greyish-olive at the base, upper portion white,  $40\text{--}50 \times 4\text{--}5 \mu$ , longest at the margin; cortex parenchymatous, cells more or less uniform in size, olive,  $5\text{--}6 \mu$  diameter; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores hyaline, narrowly elliptic-fusiform or often inclined to become clavate, straight or slightly curved,  $6\text{--}9 \times 1.5\text{--}2 \mu$ ; paraphyses slender, cylindrical, hyaline, sometimes branched.

*Peziza dematiicola*, B. & Br., Ann. Nat. Hist., n. 1070, pl. 15, fig. 20.

*Lachnella dematiicola*, Phil., Brit. Disc., p. 265.

*Trichopeziza dematiicola*, Sacc., Syll., viii. n. 1707.

*Peziza escharodes*, B. & Br., Ann. Nat. Hist., n. 1322, pl. 19, fig. 15.

*Lachnella escharodes*, Phil., Brit. Disc., p. 262; Sacc., Syll., viii. n. 1636?

On dead stems of rose and bramble, also on dead wood; sometimes growing along with a black mould.

An examination of Berkeley's type specimens of *Peziza dematiicola* and *P. escharodes* shows that the two supposed species are identical in every respect. As to whether the species described by Phillips as *Lachnella escharodes*—Brit. Disc., p. 262—is identical with the species of Berkeley, I am not certain; "spores,  $8 \times 3 \mu$ ; vertically striate or rugose," are characters not apparent in the type specimen.

### *Dasyscypha scrupulosa*. Mass.

Gregarious, sessile, subcylindrical, at first closed, then open, the margin erect, thin,  $\frac{1}{4}$  mm. across; externally minutely pubescent, hairs delicate, thin-walled, cylindrical, obtuse, rather closely septate, breaking-up at the septa when placed in water and slightly moved,  $30\text{--}40 \times 3\text{--}4 \mu$ ; whitish at the edge, pale dingy yellow, tinged greyish-olive, or greyish below; cortical cells,  $4\text{--}5 \mu$  diameter; asci clavate, 8-spored, small; spores irregularly 2-seriate, hyaline, continuous, linear-fusiform,  $5\text{--}8 \times 1.5 \mu$ ; paraphyses very slender, cylindrical.

*Peziza scrupulosa*, Karsten, Mon. Pez., p. 178.

*Lachnella scrupulosa*, Phil., Brit. Disc., p. 272.

*Pseudohelotium Scrupulosum*, Sacc., Syll., viii. n. 1222.

On dead thorn, and *Rubus idaeus*.

Very minute, when fully expanded more or less cylindrical, margin erect and acute.

Specimen in Karsten, Fung. Fenn., n. 648, examined.

### ***Dasyscypha Bullii*. Mass.**

Ascophores gregarious or sometimes clustered in small groups, very minute, rarely measuring more than  $\frac{1}{4}$  mm. across, stipitate, clavate or turbinate and closed at first, then expanding until almost plane, margin often wavy, whitish, stem very short, expanding upwards, brown, attached to the substratum by brown, septate hyphae, 3-4  $\mu$  thick; substance very thin, excipulum parenchymatous, cortical cells very narrow and elongated in the direction from stem to margin, and terminating at the margin in delicate hyphae,  $15-25 \times 3 \mu$ ; similar scattered hyphae springing from the cortical cells cause the outside to be slightly pubescent; asci clavate, apex rather narrowed, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly elliptical, ends rather pointed, or one end sometimes rounded,  $6-8 \times 1.5 \mu$  paraphyses slender, hyaline, apex very slightly clavate.

*Peziza Bullii*, W. G. Smith, Gard. Chron., 1873; Grev., vol. i. p. 120, pl. 8, fig. 3.

*Mollisia Bullii*, Phil., Brit. Disc., p. 194, pl. 6, f. 35.

*Pseudohelotium Bullii*, Sacc., Syll., viii. n. 1218.

On a wooden cistern.

Authentic specimen from author examined.

The present species cannot be a *Mollisia*; the pilose exterior and very short stem gradually expanding into the turbinate ascophore, as also the structure of the excipulum, point to *Dasyscypha*, of which it must be considered as a degraded form. It is at the same time closely allied to such species of *Mollisia* as *M. mali*, and may be looked upon as connecting *Mollisia* and *Dasyscypha*.

### ***Dasyscypha elaphines*. Mass.**

Gregarious, sessile, base somewhat narrowed, subglobose and closed, then expanding and becoming saucer-shaped; disc pale grey, externally pale buff, margin paler, everywhere covered with cylindrical, septate, obtuse, somewhat flexuous



hairs,  $40-60 \times 5-6 \mu$ ; excipulum parenchymatous, cortical cells almost quadrate, very pale, giving origin to the external hairs, and running out at the margin into parallel, obtuse hyphae; asci narrowly clavate, tip narrowed, 8-spored; spores irregularly 2-seriate, hyaline, continuous, narrowly cylindrical, ends narrowed, straight or slightly curved,  $8-10 \times 1.5-2 \mu$ ; paraphyses slender, hyaline, tip not thickened.

*Peziza elaphines*, B. & Br., Ann. Nat. Hist., n. 1325, ser. iv., vol. vii. p. 17, t. 19, f. 18.

*Mollisia elaphines*, Gillet, Champ. Fr., Disc., p. 131; Phil., Brit. Disc., p. 179.

*Pseudohelotium elaphines*, Sacc., Syll., viii. n. 1257.

On dead wood.

Type specimen examined, also Cooke, Fung. Brit., n. 659, and Rab., Fung. Eur., 1813 (specimens furnished by Broome).

Under a low power the outside of the ascophore looks as if dusted with saccharine granules, and is so described by Berkeley, and afterwards copied by Phillips; but when examined under a power of 400 diameters, the apparent granulation is seen to consist of the obtuse tips of the short hairs with which the outside is covered. During expansion of the ascophore the hairs are often arranged in vertical lines.

### *Dasyscypha siparia*. Mass.

Ascophore sessile on a broad base, globose then expanded and with a raised margin, 2-3 mm. across; the hypothecium consists of densely interwoven, aseptate, brownish hyphae, and these pass continuously into the excipulum, which is less densely interwoven, and finally the hyphae become irregularly branched, and paler free tips forming the outside of the excipulum, which is minutely pilose or furfuraceous under a lens, ochraceous, hyphae about  $5 \mu$  thick, equal; asci clavate, rather narrowed at the apex, base attenuated into a narrow pedicel, 8-spored; spores irregularly biseriate, subcylindrical, ends obtuse, slightly curved, hyaline, continuous, often 1-guttulate at each end,  $10-14 \times 2-3 \mu$ ; paraphyses filiform, equal, hyaline, about  $1\frac{1}{2} \mu$  thick.

*Peziza siparia*, B. & Br., Ann. Nat. Hist., n. 772, ser. ii., vol. xiii., 1854.



*Lachnella siparia*, Phil., Brit. Disc., p. 276 ; Sacc., Syll., viii. n. 1629.

On decorticated elm branches.

In clusters of 2-3. Remarkable for the structure of the ascophore, which consists entirely of interwoven hyphae, and no trace of parenchymatous tissue. Sometimes the hyphae extend on to the matrix, and form more or less of a subiculum.

Type specimen examined.

### §§§ Growing on ferns.

#### **Dasyscypha pteridis.** Mass.

Scattered or gregarious, sessile, globose and closed at first, then hemispherical, soft, about  $\frac{1}{2}$  mm. across; disc dingy yellowish-brown, externally blackish-brown, often with an olive tinge, minutely pilose, hairs adpressed, short, those at the margin longest, thin-walled, cylindrical, obtuse, brown, usually without septa,  $18-35 \times 3-4 \mu$ , but irregular in length and giving the margin a minutely fimbriated appearance; cortical cells elongated in the direction from base to margin, and running out into the marginal hairs,  $6-8 \times 3-4 \mu$ ; asci small, clavate, apex narrowed and thick-walled, base short and stout, 8-spored; spores 2-seriate, hyaline, elliptic-oblong,  $5-7 \times 1.5 \mu$ ; paraphyses cylindrical, slender.

*Peziza pteridis*, Alb. & Schw., Consp. Fung., p. 328, t. 12, fig. 7.

*Lachnella pteridis*, Phil., Brit. Disc., p. 256, pl. viii. fig. 47.

*Trichopeziza pteridis*, Sacc., Syll., viii. n. 1745.

On dead stems of bracken.

Distinguished by its small size, very short hairs, dark colour, and growing on bracken.

Specimens in Phil., Elv. Brit., n. 32, and Rehm, Ascom., n. 411, examined.

#### **Dasyscypha grisella.** Sacc., Syll., viii. n. 1945.

Scattered or gregarious, narrowed below into a very short, stout, stem-like base, globose and closed at first, then expanding and becoming saucer-shaped; disc greyish, often with a tinge of brown or yellow, externally covered with delicate, pale brown or almost hyaline, mostly septate, obtuse

hairs,  $30-60 \times 2.5-3 \mu$  at the margin, cortex parenchymatous, cells irregularly polygonal,  $5-8 \mu$  diameter, entire fungus thin and delicate,  $\frac{1}{4}-\frac{1}{2}$  mm. across; asci short, cylindric-clavate, apex slightly narrowed, base rather stout, 8-spored; spores irregularly 2-seriate, hyaline, continuous, cylindrical or very slightly clavate, straight or a little curved,  $6-9 \times 1.5-2 \mu$ ; paraphyses slender, cylindrical, colourless.

*Helotium grisellum*, Rehm, Hedw., 1855, p. 12.

*Phialea grisella*, Rehm, Krypt.-Fl., Disc., p. 737.

On the under surface of dead fronds of bracken.

A minute species, and difficult to detect, as it is to some extent concealed by the hairs on the surface of the frond.

Specimens examined in Rehm's Ascom., n. 766, and Rab.-Winter, Fung. Eur., n. 3572.

### *Position doubtful.*

***Dasyscypha stigmella*.** Sacc., Syll., vol. x., Suppl., n. 4546.

Ascophore shortly stipitate, white, or pale flesh-colour, clad with thin, flexuous hairs  $\frac{1}{10}$  mm. diameter, disc of the same colour; asci cylindrical; spores,  $8-10 \times 1 \mu$ ; paraphyses fusiform.

*Lachnella stigmatella*, Cooke, Grev., vol. xix. p. 86.

On rushes.

Unknown to me. The type specimens cannot be found in Herb. Cooke, Kew.

***Dasyscypha callimorpha*.** Sacc., Syll., viii. n. 1875.

Gregarious, sessile or shortly stipitate, externally tomentose, hairs colourless, hairs short, continuous, apex attenuated or acute,  $3-4 \mu$  thick; almost plane, contracted into a spherical form when dry; disc yellow or orange-yellow, up to  $\frac{1}{2}$  mm. across; asci cylindric-clavate,  $35-45 \times 5 \mu$ ; spores straight, linear-fusoid, 6-8-guttulate or spuriously multi-septate,  $17-20 \times 1.5-2 \mu$ ; paraphyses subulate,  $3 \mu$  thick.

*Lachnum callimorphum*, Karst., Myc. Fenn., p. 173.

*Lachnella callimorpha*, Phil., Grev., vol. xvi. p. 94.

On dead leaves of *Carex* and *Eriophorum angustifolium*.

Unknown to me. Unfortunately there is no fungus pre-

sent in the Kew copy of Karsten, Fung. Fenn., n. 835; said to be the present species. If the spores become truly multi-septate at maturity, it cannot remain in the present genus.

*Excluded species.*

*Peziza erythostigma*, B. & Br., Ann. Nat. Hist., 1168, t. 4, p. 31.

*Lachnella erythostigma*, Phil., Brit. Disc., p. 254.

The very meagre description, and the absence of specimens, render recognition of the present species impossible.

*Peziza episphaeria*, Mart., Erlang., p. 465.

*Lachnella episphaeria*, Phil., Brit. Disc., p. 273.

What the true species is, I know not; but, so far as Britain is concerned, the specimens I have seen belong to other species.

NEOTTIELLA. Cooke.

Ascophore sessile or subsessile, rather fleshy, often small, flattened or concave, externally downy, due to the presence of slender, thin-walled, hyaline or slightly coloured, septate hyphae; excipulum parenchymatous; asci cylindrical, 8-spored; spores uniseriate, elliptical, hyaline, continuous; paraphyses present.

*Neottiella*, Cooke, Mycographia, p. 261; Sacc., Syll., viii. p. 190.

Allied to *Humaria*, but distinguished by the downy exterior. Differs from *Tapesia* in the down being confined to the excipulum, and not extending on to the matrix as a distinct subiculum upon which the ascophores are seated, and in not growing on wood. *Dasyscypha* also differs in growing on plants, and the pilose species of *Geopyxis* are distinctly stipitate.

Growing on the ground.

*Neottiella polytrichi*. Mass.

Ascophore turbinate and closed when young, contracted below into a short stem-like base, becoming broadly open but not plane with age, rather fleshy, not very brittle. 4-8 mm. across; disc deep orange, externally whitish, distinctly downy, the down forming a delicately fringed

margin composed of hyaline, septate, cylindrical, thin-walled hyphae that are sometimes branched,  $80-100 \times 6-7 \mu$ , the hyphae are often arranged in little bundles; excipulum parenchymatous, cells elongated in the direction from base



*Neottiella polytrichi*. Fig. 1, small specimens, natural size;—Fig. 2, specimen,  $\times 5$ ; Fig. 3, section of portion of excipulum,  $\times 400$ ;—Fig. 4, ascus with spores and paraphyses,  $\times 400$ ;—Fig. 5, spores in various stages of development,  $\times 800$ .

to margin; cortical cells irregularly polygonal,  $12-18 \mu$ , giving origin to the external hairs; asci cylindrical, apex slightly truncate, base rather suddenly narrowed into the pedicel, 8-spored; spores obliquely 1-seriate, hyaline, continuous, ends acute, with one large median oil-globule, for

some time quite smooth, finally minutely warted,  $24-28 \times 11-13 \mu$ : paraphyses septate, slender below, becoming slightly clavate at the tip, which contains orange granules.

*Peziza polytrichi*, Schum., Enum. Plant. Saellandiae, Sept. et Or., p. 423 (1803); (not of Phil., Brit. Disc., p. 87).

*Peziza rutilans*, Phil., Brit. Disc., p. 89.

*Peziza (Sarcoscyphae) albo-cincta*, Berk. & Curt., Notices of N. Amer. Fungi, n. 726, in Grev., vol. iii. p. 154 (1875).  
Type examined.

*Neottiella ovilla*, Sacc., var. *flavodisca*, Cke. & Mass., Grev., vol. xxi. p. 70.

*Peziza vivida*, Nyl., Flora, 1865, p. 476; Phil., Brit. Disc., p. 88.

On the ground among moss, especially species of *Polytrichum*.

*Peziza vivida*, Nyl., as represented in Syd., Myc., March, n. 277, and the British specimens from Rannoch only differ from the typical *N. polytrichi*, as here interpreted, by the somewhat longer stem-like base; the spores and internal structure are identical. The fact that in *N. polytrichi* the spores remain for a long time smooth, and the external down to a greater or less extent disappears with age, has probably caused confusion. I can find no specimens agreeing with the fungus figured as *Peziza polytrichi* by Cooke in "Mycographia," fig. 50, and described by Phillips in Brit. Disc., p. 87. The species these authors have had in view evidently belongs to the genus *Barlaea*, but whether synonymous with any described British species depends on an examination of the type specimen.

Specimens examined in Cooke, Fung. Brit., exs., nos. 188, 475, and 476; Phillips, Elv. Brit., n. 15; and Roum., Fung. Gall., n. 4045.

### ***Neottiella corallina*. Mass.**

Scattered, sessile, hemispherical, up to 3 mm. across, disc deep coral-red, slightly concave; excipulum composed of interwoven, cylindrical or irregular, septate hyphae,  $7-9 \mu$  thick; margin irregularly fimbriate with short septate hairs,  $20-40 \times 4-5 \mu$ ; externally pale orange, downy, the hairs being irregularly branched, septate, and colourless; asci clavate, narrowed at the base into a long, slender, often

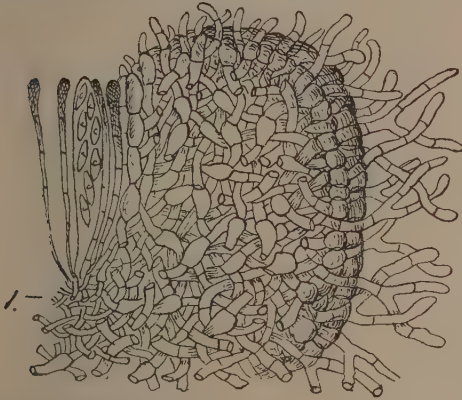
curved pedicel, 8-spored; spores irregularly biseriate, fusiform, often very slightly inequilateral, hyaline, continuous, 2-4-guttulate,  $28-32 \times 6-8 \mu$ ; paraphyses filiform, septate, apex clavate and containing orange granules.

*Peziza corallina*, Cooke, Grev., vol. iii. fig. 83; Cke., Mycogr., p. 19, fig. 30; Phil., Brit. Disc., p. 102.

*Ascobolus coccineus*, Crouan, in Fuckel's Fung. Rhen., exs., n. 1854.

*Humaria coccinea*, Sacc., Syll., viii. n. 456.

*Leucoloma coccinea*, Fckl., Symb. Myc., p. 318.



*Neottiella corallina*, Mass.—section of portion of ascophore,  $\times 350$ .

On the ground among moss, heather, &c.

Superficially closely resembling *Neottiella leucoloma*, but distinguished by the clavate ascus, and fusiform, biseriate spores.

Cooke in establishing the present species gave *Ascobolus coccineus*, Crouan, as a synonym, and as a matter of course this has been copied by Phillips and Saccardo; however, I am not certain as to the identity of the two plants. Crouan, in the specific diagnosis—Ann. Sci. Nat., ser. iv. vol. vii., 1857, p. 175, pl. iv., figs. d, 15-19—of this species, says, "spores oblongues, non atténuées aux extrémités," but in

his figure the spores are fusiform with acute tips. The description given above is from Cooke's *Peziza corallina*, with which the specimen in Fuckel's *Fung. Rhen.*, n. 1854, is identical.

***Neottiella leucoloma*. Mass.**

Scattered, sessile but more or less narrowed at the base, concave, then becoming almost plane, rather fleshy, 2-3 mm. across; excipulum composed of septate hyphae, 6-8  $\mu$  thick and running more or less parallel; externally pale orange, margin furnished with an irregular fringe of colourless, septate hairs, 40-60  $\times$  4-5  $\mu$ ; below the margin stout, thick-walled, branched, hyaline hyphae originate from the cells of the excipulum; disc orange red; asci cylindrical, base narrowed and usually slightly wavy, 8-spored; spores obliquely uniseriate, elliptic-oblong, smooth, hyaline, continuous, sometimes 1-2-guttulate, 17-21  $\times$  9-10  $\mu$ ; paraphyses filiform, gradually becoming clavate towards the apex, which is 4-5  $\mu$  thick, and sometimes curved.

*Octospora leucoloma*, Hedwig, *Musc. Frond.*, p. 13, t. 4, fig. A.

*Peziza leucoloma*, Phil., *Brit. Disc.*, p. 91; Cooke, *Mycogr.*, fig. 28.

*Humaria leucoloma*, Sacc., *Syll.*, viii. n. 449.

*Leucoloma Hedwigii*, Fekl., *Symb.*, p. 317.

On the ground among moss.

Specimen in Kew Herb., named by Persoon, examined; also Rehm, *Ascom.*, n. 351.

Closely allied to *Neottiella polytrichi*, but distinguished by the smaller spores, which, so far as observation goes, appear to remain perfectly smooth; the margin and exterior is also less downy.

***Neottiella cornubiensis*. Cke., *Mycogr.*, fig. 309; Sacc., *Syll.*, viii. n. 773.**

Ascophore 1-2 cm. across, sessile, at first hemispherical, soon plane, with the narrow upturned margin alone free; excipulum parenchymatous, cells irregularly polygonal, large, 18-25  $\mu$  diameter, pale yellow, dotted towards the margin with short, blunt, thin-walled septate hairs, slightly coloured, 30-50  $\times$  6-8  $\mu$ ; lower down the hairs take the form of colourless, septate hyphae, and fix the fungus to



the soil; disc orange; asci cylindrical, 8-spored; spores obliquely uniseriate, elliptic-oblong, hyaline, continuous, at first smooth, but becoming sparsely ornamented with very minute warts at maturity,  $18-22 \times 12-13 \mu$ ; paraphyses linear, straight, becoming clavate upwards, apex about  $4 \mu$  thick, hyaline.

*Peziza cornubiensis*, B. & Br., Ann. Nat. Hist., ser. ii. vol. xiii. p. 17; (n. 767).

*Lachnea cornubiensis*, Phil., Brit. Disc., p. 229; pl. vii. f. 42.

On manured ground.

Sessile,  $\frac{3}{4}$  of an inch broad, depressed, attached to the soil by villous down; margin free, clothed with delicate obtuse articulate hairs. (B. & Br.).

Type specimen in Herb. Berk., Kew, examined.

**Neottiella microspora.** Cke. & Mass., Grev., vol. xxii. p. 41.

Ascophore 2 mm. to 1 cm. across, sessile, fleshy, regular or deformed by mutual pressure, subglobose then expanded and the greenish yellow disc becoming quite plane or even slightly convex; externally and also the narrow slightly raised margin white, and densely clad with colourless, interwoven, septate hyphae about  $50 \times 3.5 \mu$ ; asci cylindrical; spores 8, obliquely uniseriate, smooth, hyaline, elliptical,  $14-15 \times 7-8 \mu$ ; paraphyses colourless, filiform, about  $1.5 \mu$  thick, very slightly thickened at the apex; excipulum parenchymatous, cells small.

On a dunghill.

Usually crowded and of irregular form from lateral pressure; circular when growing singly. Immersed up to the margin. Disc usually pale yellow-green, sometimes sulphur-colour with only a tinge of green.

**Neottiella nivea.** Sacc., Syll., viii. n. 784.

Gregarious or scattered, sessile, subglobose, snow-white, margin incurved, rather fleshy, 2-4 mm. across, contracted and closed when dry, densely clothed externally with somewhat spreading straight, white, sparsely septate, subulate hairs,  $150-250 \times 7-10 \mu$  at the margin, where they are best developed and the walls slightly thicker than elsewhere; excipulum and hypothecium formed of stout, hyaline, densely interwoven hyphae; asci cylindrical, apex obtuse, 8-spored;

spores obliquely 1-seriate, hyaline, continuous, 2-guttulate, fusiform, ends acute, straight,  $28-30 \times 10-12 \mu$ ; paraphyses hyaline, clavate at the tip.

*Peziza nivea*, Romell, Bot. Notiser, 1889, p. 26.

On decaying vegetable matter, pine leaves, &c., on the ground.

Allied to *N. fossulae*, but distinguished by the marginal hairs—more especially—being straight, somewhat rigid, and pointed, not thin-walled, obtuse, and wavy, as in the last named species.

The first British specimens were found by Mr. Rea in Mulgrave woods, near Whitby, at the meeting of the Yorks. Nat. Union Fungus Foray, Sept. 1894.

Authentic specimen from Romell examined.

**Neottiella fossulae.** Sacc., Syll., viii. n. 783.

Sessile, partly immersed in the earth, closed at first, then hemispherical, finally almost plane, margin slightly incurved, entirely white, about 1 cm. across when fully expanded; externally densely clothed with hyaline, thin-walled, cylindrical, flexuous, septate hyphae about  $6-8 \mu$  thick, towards the base of the ascophore these hyphae are branched, and attach the plant to the soil; excipulum and hypothecium formed of interwoven hyphae; cortex parenchymatous; asci cylindrical, apex obtuse, 8-spored; spores obliquely 1-seriate, smooth, hyaline, continuous, fusiform, ends pointed, straight, usually 2-guttulate,  $23-25 \times 10-11 \mu$ ; paraphyses slender, septate, hyaline, apex slightly thickened.

*Peziza fossulae*, Limminghe, MS. in Herb.; Cooke, Mycogr., p. 212, fig. 359.

On the naked ground.

Specimens from Limminghe, in Herb. Kew, examined.

Distinguished from *N. nivea* by growing partly immersed in the earth, and also by all the external hairs being thin-walled, cylindrical, and flexuous.

## GEOPYXIS. Persoon (emended).

Ascophore stipitate, rather fleshy, closed at first, then cup-shaped or nearly plane, externally pilose, downy, scurfy, or

glabrous; stem usually slender, often tapering at the base and rooting, not longitudinally grooved or lacunose; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elongated; paraphyses present.

*Geopyxis*, Pers., Myc. Eur., i. p. 42; Sacc., Syll., viii. p. 63 (in part).

*Sarcoscypha*, Fries, Syst. Myc., ii. p. 78; Sacc., Syll., viii. p. 153 (in part).

*Peziza*, Phil., Brit. Disc., p. 43 (in part).

Growing on the ground or among dead leaves, rarely on wood.

The leading characters of the genus as here understood are: ascophore large, never less than 1 cm. across, stipitate; stem even, that is not grooved or lacunose. In *Dasyascypha* the ascophore is always much smaller, rarely more than 1–2 mm. across, the exterior more distinctly pilose, and the stem very short or absent. *Acetabula* differs in the stout, grooved or lacunose stem; finally the species of *Sclerotinia* agree in the more or less elongated, slender stem, but differ in being absolutely glabrous, and in springing from a sclerotium.

\* *Externally tomentose or downy.*

***Geopyxis majalis*.** Sacc., Syll., viii. n. 247.

Scattered, stipitate, margin incurved and closed when young, then expanded and cup-shaped, narrowed downwards into the short, stout stem, rather fleshy, up to  $\frac{1}{2}$  cm. broad; disc orange-yellow, externally and the stem white and minutely downy; cortex parenchymatous, cells irregularly polygonal, 5–6  $\mu$  diameter; asci cylindrical, apex narrowed, 8-spored; spores smooth, continuous, hyaline, elliptical, ends rather acute, 10–12  $\times$  6  $\mu$ , obliquely 1-seriate; paraphyses very slender, cylindrical, hyaline.

*Peziza majalis*, Fries, Nov. Symb. Myc., p. 120.

On the ground.

The above description is drawn up from a specimen in Herb. Berk., from Fries.

***Geopyxis coccinea*.** Mass.

Scattered or in groups of 2–3 specimens, stipitate; at first closed, then expanding and becoming shallowly cup-shaped,

margin entire, 2-4 cm. across; disc clear and deep carmine, externally whitish or pinkish, delicately tomentose, due to the presence of wavy, usually aseptate, hyaline, cylindrical hyphae, 5-6  $\mu$  thick; stem 1-2 cm. long, 3-5 mm. thick, whitish and tomentose; excipulum formed of loosely interwoven hyphae which become more closely compacted and arranged parallel at the periphery, many of the ends running out and forming the external tomentum; asci cylindrical, 8-spored; spores 1-seriate, elliptic-oblong, ends obtuse, hyaline, wall rather thick and forming a hyaline border, straight,  $25-30 \times 8-9 \mu$ ; paraphyses very slender, hardly thickened at the tips.

*Elvela coccinea*, Scop., Carn., p. 479.

*Peziza coccinea*, Jacq., Austr., t. 169; Phil., Brit. Disc., p. 203; Cooke, Mycogr., fig. 95.

*Sarcoscypha coccinea*, Sacc., Syll., viii. n. 618.

On rotten branches lying on the ground. Spring.

Readily distinguished among the large, stipitate *Pezizae* by the deep rose-red or carmine disc and the whitish, tomentose exterior. The stem varies considerably in length; when the fungus springs from the underside of a branch, the stem is often elongated and curved. The base of the stem is attached to the branch by a mass of whitish, tomentose mycelium, and for this reason the species was placed in the genus *Plectania* by Fuckel. This species is abundant in early spring in some of the woods near Scarborough, and is regularly collected and sold along with moss for decorative purposes.

*Var. albida*. Mass.

Disc cream-colour, otherwise as in the typical form.

On fallen branches. Spring.

*Geopyxis Cookei*. Mass.

Crowded, rarely scattered, stipitate, fleshy, rather brittle, at first closed and globose, soon expanding and becoming shallowly saucer-shaped, often irregular in form from mutual pressure, disc yellowish ochraceous, externally paler, downy, owing to the presence of hyaline, septate, thin-walled hairs  $60-80 \times 8 \mu$ ; 2-3 cm. across; stem 1-2½ cm. long, stout, tapering to the point, pallid, downy, rooting; excipulum formed of densely interlaced septate, colourless hyphae,

6–8  $\mu$  thick, passing into parenchyma at the cortex, cells polygonal, 14–20  $\mu$  diameter; asci cylindrical, apex rather truncate, narrowed below into a long pedicel, 8-spored; spores obliquely 1-seriate, hyaline, 1–2-guttulate, elliptical, ends obtuse, verrucose,  $16\text{--}18 \times 10\text{--}11 \mu$ ; paraphyses septate, slightly clavate.

*Peziza radiculata*, Cooke, Grev., iii. fig. 92; Cooke, Mycogr., fig. 99 (not of Sowerby).

*Lachnea radiculata*, Phil., Brit. Disc., p. 202, pl. vi. f. 38.

*Sarcoscypha radiculata*, Sacc, Syll., viii. n. 629.

On the ground in gardens, fir-woods, &c.

The present species appears to have first been confounded with the true *Geopyxis radiculata* by Cooke, in Grevillea, vol. iii., fig. 92, which is called *Peziza radiculata*, Sow., and and figured with rough spores. The present species is again figured by Cooke in Mycographia, fig. 99, as *P. radiculata*, Sow., and we get the description of Sowerby's fungus as given by Berkeley in Engl. Flora, t. 5. p. 192, with the additional statement that the spores are asperate. This last-named description, with a little trimming up, is given by Phillips in Brit. Disc., p. 203; finally, Phillip's description is copied by Saccardo, Syll., viii. n. 629.

The present species is at once distinguished from *G. radiculata* by the ochraceous hymenium, and the larger, verrucose spores.

Cooke's specimens figured in "Grevillea" and "Mycographia" examined.

*Var. Percevalii*, Phil., Brit. Disc., p. 203.

Differing in the ascophore being notched to the base on one side, as in the genus *Otidea*; disc bright ochraceous.

On the ground.

### **Geopyxis radiculata.** Mass.

Usually more or less tufted, stipitate, at first globose and closed, then expanding and becoming hemispherical, margin usually entire, 2–3 cm. across, fleshy and rather brittle; disc clear sulphur-colour; externally white, downy, due to the presence of thin-walled, hyaline, somewhat pointed, sparsely septate hairs,  $40\text{--}60 \times 5\text{--}6 \mu$ , base of ascophore usually more or less furnished with anastomosing ridges, or with irregular depressions; stem 2–3 cm. long, 4–6 mm. thick where it

springs from the cup, tapering to the point, buried in the ground, covered with white down; asci cylindrical, 8-spored; spores obliquely 1-seriate, elliptic-oblong, ends rounded, 1-2-guttulate, persistently smooth, hyaline,  $14 \times 7-8 \mu$ ; paraphyses septate, clavate.

*Peziza radiculata*, Sowerby, Engl. Fung., t. 114 (not Cooke, Mycogr., fig. 99).

On the ground, among manure, &c.

Sowerby's type specimen, figured in "English Fungi," pl. 114, examined. These specimens are now in the Kew Herbarium.

Found in Wanstead Garden, Essex, Oct. 13th, 1794, and in the autumn of 1795, rooted up to the cup in litter and earth. The inside is a thin lining of nearly an uniform yellow. The outer side and the radicle are white, and a little woolly; the bottom of the cup being somewhat corrugated with irregular reticulations or veins. (Sowerby).

### **Geopyxis insolita. Mass.**

Scattered, stipitate, clavate and closed at first, expanding until saucer-shaped, fleshy, fragile, 1.5-2 cm. across, disc pale ochraceous-white, externally whitish, downy when young, then almost glabrous, the margin erect, acute, and often splitting; cortex formed of hexagonal cells up to  $25 \mu$  diameter; stem subcylindrical, even, smooth, whitish, 1 cm. long and up to  $\frac{1}{2}$  cm. thick, springing from a white, spreading mycelium; asci cylindrical, apex somewhat truncate, 8-spored; spores hyaline, smooth, continuous, elliptical, ends obtuse,  $15-17 \times 8 \mu$ , obliquely 1-seriate; paraphyses slender, septate, very slightly clavate.

*Peziza insolita*, Cooke, Mycogr., fig. 375; Phil., Brit. Disc., p. 45.

On decaying leaves amongst mould in a fig-house.

Cooke says the spores measure  $22-25 \times 10-12 \mu$ , but I find them smaller in the specimen examined.

Type specimen examined.

### **Geopyxis cocotina. Mass.**

Ascophore fleshy, stipitate, hemispherical, then expanded and almost plane; margin acute, often split at maturity, 1.5-2.5 cm. across; excipulum parenchymatous, cells large, irregularly polygonal; externally whitish downy, due to the



presence of hyaline, thin-walled hairs, 2-3-septate, and often slightly constricted at the septa,  $40-60 \times 6-8 \mu$ ; disc pale orange colour; stem about 1 cm. long, rather slender, tapering to the point, rooting, whitish; asci cylindrical, base attenuated, 8-spored; spores obliquely uniseriate, elliptical, smooth, continuous, hyaline,  $15-18 \times 8-10 \mu$ ; paraphyses filiform, straight, septate, apex incrassated.

*Peziza cocotina*, Cooke, Grev., v. p. 61; Mycogr., fig. 356.

*Lachnea cocotina*, Phil., Brit. Disc., p. 206.

*Sarcoscypha cocotina*, Sacc., Syll., viii. n. 636.

On cocoa-nut fibre, sawdust, &c.

Type specimen examined.

*Var. linteicola*. Caespitose and often irregular from lateral pressure, very fragile, sessile or the base narrowed into a short stem,  $\frac{1}{2}-\frac{3}{4}$  in. across, disc tawny, remainder as in type.

*Peziza linteicola*, Phil. & Plow., Brit. Disc., p. 64.

*Sarcoscypha linteicola*, Sacc., Syll., viii. n. 280.

On damp, rotting linen cloth.

Authentic specimen examined.

Cups  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch broad; sometimes divided to the base on one side, the edges of the division involute, at others entire, cupulate, arising from white creeping mycelium; sporidia vary much in size, and are shortly elliptical, approaching globose. The apices of the paraphyses are clavate or pear-shaped, with one or two large elliptic transparent nuclei devoid of granules. The cells forming the exterior of the cup are rather small (from  $10-20 \mu$  in diameter). (Phillips.)

### *Geopyxis parvispora*. Mass.

Ascophore stipitate, clavate at first, then expanded, up to 3 cm. in diameter and as much in height, often distorted and confluent, more or less turbinate; disc plane, rarely slightly concave, whitish, becoming dusky, scarcely marginate; fleshy, soft, externally white, clad, on the stem more especially with short, hyaline down which becomes scanty upwards, leaving the margin almost naked; stem thick, variable, gradually expanding into the disc; asci cylindrical, spores 8, obliquely uniseriate, hyaline, smooth, narrowly elliptical, ends rounded, biguttulate,  $16-20 \times 4-5 \mu$ ; paraphyses very



slender, scarcely thickened upwards, often granular externally.

*Sarcoscypha tenuispora*, C. & M., Grev., xxi. p. 121.

On sticks and leaves lying on the ground.

Usually attached by white mycelium to the matrix. Remarkable for the scarcely depressed disc, and the narrow spores.

**\*\* Externally scurfy or verruculose.**

***Geopyxis cupularis*.** Sacc., Syll., viii. n. 246.

Ascophore stipitate, hemispherical, margin erect, irregularly crenulate, thin; disc fawn-colour or yellowish, externally similar in colour or paler, rather coarsely scurfy; excipulum parenchymatous, cells irregularly polygonal, 8–12  $\mu$  diameter, forming irregular groups at the periphery and causing the scurfiness of the exterior; 1–2 cm. across; stem slender, somewhat rooting, 1 cm. long, or sometimes almost obsolete, and then the base of the ascophore is often more or less puckered; asci cylindrical, apex rounded, base narrowed, 8-spored; spores 1-seriate, hyaline, continuous, broadly elliptical, ends obtuse, often 1–2-guttulate. 18–20  $\times$  10–12  $\mu$ ; paraphyses slender, hyaline, septate, slightly clavate at the tip.

*Peziza cupularis*, Linn., Suec., n. 1273; Phil., Brit., Disc., p. 47, pl. iii., fig. 12.

On the ground, in damp places among moss, &c.

Specimens examined from Phillips, Elv. Brit., n. 155, and Rehm, Ascomy., n. 8.

Possesses many points in common with *G. carbonaria*, as the crenulate margin, and variability in length of stem, but known by the duller colour, and broader spores.

***Geopyxis petaloidea*.** Sacc., Syll., viii. n. 225.

Ascophore stipitate, fleshy and firm, margin deeply and irregularly lobed and waved; disc rugose, yellowish-brown, externally dingy-brown, scurfy or verrucose, base rugose; excipulum parenchymatous, about 1 cm. across; stem up to 1 cm. long, tapering to the base; asci narrowly cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, continuous, verruculose, elliptical, often guttulate, 14–15  $\times$

8  $\mu$ ; paraphyses slender, slightly thickened upwards, septate, hyaline.

*Peziza petaloidea*, Cke. & Phil., Brit. Disc., p. 46.

On the ground.

Type specimen examined.

This has somewhat the aspect of *Peziza firma* in an old stage of growth. The cup is lobed, undulate, decurved at the margin; the disc is umbilicate, radiately wrinkled, 8 lines broad across the widest part; the under side of the cup is smoky-brown, minutely warted, wrinkled longitudinally near its junction with the stem, which tapers towards the base, and is 5 lines high and about 1 line thick near the middle. (Phillips.)

The colours given are those seen in the dry specimen, and may be slightly different fresh.

**Geopyxis carbonaria.** Sacc., Syll., viii. n. 242.

Ascophore stipitate, campanulate, then more expanded, but remaining concave, margin erect, minutely and irregularly crenulate, thin, disc ochraceous-red, deeper and brighter when young, externally whitish and minutely scurfy; excipulum parenchymatous, cells 10–16  $\mu$  diameter;  $\frac{1}{2}$ –1 $\frac{1}{2}$  cm. broad; stem slender, length very variable, in some instances 1 cm. long, in others almost obsolete, whitish; asci cylindrical, base narrowed, apex rounded, 8 spored; spores uniseriate, smooth, hyaline, continuous, narrowly elliptical, ends rather narrowed, 18–19  $\times$  7  $\mu$ ; paraphyses slender, slightly clavate, septate, hyaline.

*Peziza carbonaria*, Alb. & Sz., Consp. Fung. Lus., p. 314, t. iv., f. 2; Phil., Brit. Disc., p. 49; Cooke, Mycogr., fig. 284.

On scorched ground, charcoal beds, &c.

Allied to *G. cupularis*, but distinguished by the narrower and more pointed spores, and the nearly glabrous outside of the ascophore.

Specimen in Rehm, Ascom., n. 702, examined.

**Geopyxis carnea.** Sacc., Syll., viii. n. 211.

Ascophore stipitate, saucer-shaped at maturity; margin usually slightly incurved; entire, thin, rather firm and elastic; disc dingy yellowish-red, externally darker and scurfy, 1–2 $\frac{1}{4}$  cm. across; excipulum formed of closely interwoven septate hyphae, passing into a parenchymatous cortex,

the cells growing into projecting groups to form the scurfy protuberances; stem slender,  $\frac{1}{2}$ –1 cm. long, brownish, base of ascophore often plicate; asci cylindrical, apex rounded, base narrowed, 8-spored; spores obliquely uniseriate, smooth, hyaline, continuous, elliptical, ends obtuse, usually 1–2-guttulate,  $14\text{--}16 \times 6\text{--}7 \mu$ ; paraphyses slender, hyaline, septate, the slightly thickened tip often bent.

*Peziza carnea*, Cke. & Phil., Brit. Disc., p. 48.

On the ground.

Type specimen examined.

The present species was considered by Berkeley as "*Peziza cupularis*, var." It is, however, quite distinct from *G. cupularis* in the nature of the excipulum and the somewhat smaller spores. The colour is described from dried specimens only.

\*\*\* *Externally glabrous.*

**Geopyxis Bloxami.** Mass., Grev., vol. xxi. p. 100.

Ascophore stipitate, hemispherical, then expanding and becoming saucer-shaped, or sometimes nearly plane, thin, rather flexible, margin entire,  $\frac{3}{4}$ – $1\frac{1}{2}$  cm. across; externally smooth and even; stem  $\frac{1}{2}$ –1 cm. long, about 3 mm. thick, equal, smooth, even; every part pale tan (in the dry state); excipulum formed of slender, hyaline, thin, intricately interwoven hyphæ; these pass near the surface into a parenchymatous cortex composed of polygonal cells,  $6\text{--}8 \mu$  diameter; asci cylindrical, apex truncate, narrowed at the base into a slender pedicel, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, elliptic-oblong, ends obtuse,  $34\text{--}38 \times 8\text{--}9 \mu$ ; paraphyses septate, about  $2 \mu$  thick, apex not thickened, sometimes branched.

On the ground.

Allied in the form and size of the spores, and also in the structure of the excipulum, to *G. coccinea*, but distinguished by colour, being glabrous externally, and in growing on the ground.

**Geopyxis rapulum.** Sacc., Syll., viii. n. 209.

Ascophore stipitate, saucer-shaped then almost plane, margin entire at first, then drooping and somewhat split,

thin, fragile, glabrous, translucent, varying from pale straw-colour to nearly tawny, 1 cm. or more across, externally marked with fine lines radiating from the stem; excipulum composed entirely of uniform, densely interwoven hyphae, a narrow zone at the base of the asci brownish, remainder hyaline; stem 2-3 cm. long, 2-3 mm. thick, tapering downwards, mostly buried; asci cylindrical, 8-spored; spores 1-seriate, hyaline, smooth, continuous, elliptical, ends obtuse,  $12-15 \times 7-8$ ; paraphyses hyaline, filiform, tips very slightly thickened.

*Peziza rapulum*, Bull., Champ. Fr., p. 265, t. 485, fig. 2; Cooke, Mycogr., fig. 197; Phil., Brit. Disc., p. 50.

On the ground among pine leaves, &c. Spring.

Specimen determined by Berkeley and figured by Cooke in Mycographia, fig. 197, examined.

The stem is rooting and the greater part buried in the ground or among leaves, the buried portion is fibrillose, or, according to Holmskiöld, Fung. Danicis, ii. p. 24, t. 9, densely clothed with ferruginous down.

Gillet—Disc. France, p. 38, with fig.—has figured the present species springing from an elongated, blackish sclerotium about 1 cm. long; if this be the true plant, it will have to be placed in the genus *Sclerotinia*, with which it agrees more closely in general structure than with *Geopyxis*.

### *Geopyxis ammophila*. Sacc., Syll., viii. n. 238.

Ascophore stipitate, at first subglobose with a small aperture, then more or less turbinate, and the margin irregularly split, at this stage 2.5-3.5 cm. across, finally expanding and becoming almost plane and up to 6 cm. across, fleshy and very brittle; externally pale brown, covered with particles of sand adhering to the gelatinised outer cells; cortical cells irregularly polygonal, 9-18  $\mu$  diameter; disc brown; stem 3-5 cm. long, 4-6 mm. thick above, simple, or with 2-3 short branches; usually buried in the sand; asci cylindrical, apex rounded, 8-spored; spores obliquely uniseriate, elliptical, smooth, hyaline, continuous,  $15-20 \times 8-10 \mu$ ; paraphyses not numerous, slender, unbranched, slightly thickened upwards.

*Peziza ammophila*, D. & M., Fl. Alger., t. 25, fig. 2; Cooke, Mycogr., figs. 100 (copied from Flor. Alg.) & 373; Phil.,

Brit. Disc., p. 49; Trail, Ann. Scot. Nat. Hist., Jan. 1893, p. 37.

Among dry sand close to the upper limits of the tide-mark, usually in the vicinity of *Elymus*.

Professor Trail, F.R.S., of Aberdeen, has given a very interesting account, in the journal quoted above, of observations made on the present species, which occurs in considerable abundance on the coast of Aberdeenshire. I have made use of this account in drawing up the specific character, and also add the following extract from the same.

"The appearance varies so greatly with the age of the specimen that it would be difficult to recognise the species but for the fact that all the intermediate forms can be traced in the various groups.

"From personal observation, I find the course of development to be as follows. The fungus first pushes its way through the sand as a sphere, rather flattened above, and continued below as a thick tapering stalk or "rooting-stem." The surface is so covered with sand as to be scarcely visible. On removing as much of the sand as is possible without injuring the tissues, the surface is seen to be very pale brown, and appears free from hairs, though under the microscope one finds the surface loosely covered with a downy coating. The apical half of the stalk bears a more evident mycelium. The entire fungus is fleshy and brittle, so as to render it somewhat difficult to procure perfect specimens. The stalk is peculiarly apt to break away unless very carefully handled. On their first appearance the cups do not rise above the surface of the sand which they much resemble in colour. The smallest that I have seen were about half an inch in diameter, or rather less, and the only indication of the opening of the cup was a small hole in the middle of the upper surface. The cups continue to enlarge, and the central hole widens, remaining circular and still surrounded by an entire inflexed margin, so that the brown hymenium lining the interior is in full view. When the cup has reached a diameter of about an inch, it has assumed the form figured in Cooke's 'Mycographia,' figures 100, 373. The margin becomes split rather irregularly by the more rapid growth of the adjacent tissues; and the cup becomes turbinate. The proportions of the cup vary a good deal.

I have found them in this stage upwards of  $1\frac{3}{4}$  inches (42 mm.) in diameter. The tissues lining the cup continues to increase; and at last the hymenium may become only slightly concave, or flattened, or even slightly convex, so as to resemble greatly *Peziza ancilis*, Rehm (a species that I have found in Aberdeenshire in April, on ground covered with old sawdust). In this condition I have found examples exceeding  $2\frac{1}{2}$  inches (60 mm.) in breadth.

**Geopyxis undata.** Mass.

Gregarious, stipitate and rooting, fleshy, disc slightly concave, afterwards expanded, then reflexed, generally corrugated, yellowish, buff, grey, purple, or pallid, 1–2 mm. across; asci cylindrical, 8-spored; spores elliptic, smooth,  $10 \times 5 \mu$ , obliquely 1-seriate; paraphyses stout, enlarged upwards.

*Peziza undata*, W. G. Smith, Grev., vol. i. p. 136, pl. 10, figs. 1–2; Cooke, Mycogr., fig. 279; Phil., Brit. Disc., p. 79; Sacc., Syll., viii. n. 320.

On stems of tree-ferns, Veitch's Nursery, Chelsea.

Specimen in Herb., Kew, communicated by the author, examined, but unfortunately the structure of the ascophore could not be determined. Remarkable for the small spores. The asci show no trace of blue when treated with iodine.

**Geopyxis muralis.** Sacc., Syll., viii. n. 245.

Gregarious, stipitate, concave at first then nearly plane, firm, centre fleshy, becoming thin towards the margin. glabrous, entirely pale clay-colour, 4 mm. to 1 cm. across; stem 2–4 mm. long, rather slender; asci cylindrical, 8-spored; spores 1-seriate, hyaline, continuous, smooth, elliptical,  $14 \times 8 \mu$ ; paraphyses very slender, not thickened at the tips.

*Peziza muralis*, Sow., Eng. Fung., t. 251; Phil., Brit. Disc., p. 48.

On clay.

A somewhat doubtful species. I can find no plants on the lumps of clay in the Kew Herb., on which the type specimens, figured by Sowerby, grew. The description of the asci, spores, and paraphyses are from a sketch by Phillips, who had examined the type before all the specimens had decayed.



## ANTHOPEZIZA. Wettstein.

Ascophores stipitate, solitary or several springing from a common base, piriform and closed at first, then funnel-shaped, the crenate margin spreading, externally and the stem pubescent; hypothecium, excipulum, and cortex formed of slender, densely interwoven hyphae; asci cylindrical, apex truncate, 8-spored; spores obliquely 1-seriate, smooth, hyaline, fusiform, 3-5-septate at maturity; paraphyses slender, septate.

*Anthopeziza*, Wetts., Zool.-Bot. Gesell. Wien, 1885, p. 382.

Allied to *Geopyxis*, but distinguished by the large, fusiform spores being 3-5-septate at maturity.

***Anthopeziza mirabilis*. Mass.**

Scattered, ascophores growing singly, or several springing from the same base, stipitate, at first piriform and closed, then funnel-shaped with the crenate margin more or less spreading, rather fleshy and brittle,  $\frac{1}{2}$ -1 cm. across; disc bright crimson, externally white, tomentose, stem 2-4 cm. long, slender, slightly thickened upwards, white, tomentose, more or less rooting; hypothecium and excipulum formed of septate, interwoven hyphae, which run out as thin-walled, cylindrical hairs to form the external down; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, hyaline, smooth, elliptical, ends pointed, for a long time continuous and 3-5-guttulate, then becoming 3-5-septate,  $45-50 \times 15-16 \mu$ ; paraphyses slender, septate, apex not thickened but septate with crimson granules, sometimes branched.

*Peziza mirabilis*, Borszczow, Fungi Ingrici, p. 61, tabs. 4-5 (1857); Cooke, Mycogr., fig. 93 (spore incorrect in shape and size); Phil., in Grev., vol. xvii. p. 83.

*Sclerotinia baccata*, Fekl., Symb. Myc., p. 331, tab. iv. fig. 38 (one spore).

*Anthopeziza Winteri*, Wettst., Zool.-Bot. Gesell. Wien, 1885, p. 383 with fig.

Among pine leaves, also among grass.

Specimens collected by Professor W. H. Trail, F.R.S., growing in clusters of 2-6 among grass, on the banks of



the Dee, near Ballater, accepted as typical. The spores remain continuous and 3-5-guttulate for a considerable time, finally becoming 3-5-septate, but the appearance of the septa is very erratic, sometimes one at a short distance from each end and are first formed, sometimes a median one. Saccardo—Syll., viii. n. 622—has given the present species as a synonym under *Sarcoscypha protracta*, Fries; this is certainly a mistake, as proved by examination of specimens of the last-named fungus from Fries. Fuckel, in describing his *Sclerotinia baccata*, queries the presence of a sclerotium, no such structure was found by Dr. Trail in the Scottish specimens, neither does the structure of the ascophore and the villous exterior suggest the genus *Sclerotinia*. In Symb. Myc., Append. ii., p. 65, Fuckel identifies his fungus with a species described as *Microstoma hyemale* by Milde in Bot. Ztg., 1852, p. 208, and in consequence alters the name to *Sclerotinia hyemalis* (Milde) Fuckel. If Milde's species is actually identical with the fungus described above, the name should be *Anthopeziza hiemalis*.

### SEPULTARIA. Cooke (emended).

Ascophore large, sessile, subterranean, globose, and completely closed when young; during growth the apex is ruptured in a more or less stellate manner, exposing the disc, and the fungus protrudes above the surface of the ground, rather fleshy, colour dingy; externally densely clothed with matted, thin-walled, cylindrical, septate hairs, or almost glabrous; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, continuous, smooth, elliptical; paraphyses present.

*Sepultaria*, Cooke, Mycographia, p. 259 (as a section of *Peziza*).

Terrestrial. Distinguished from *Peziza* by being subterranean at first, and completely closed, finally rupturing at the apex in a stellate manner, hence the margin is broken up into pointed teeth. Probably a primitive type of the *Pezizae*.

#### *Sepultaria sepulta*. Mass.

Ascophore at first subterranean, becoming more or less

exposed at maturity, depresso-globose and entirely closed when young, then opening by a small mouth, the margin becoming split into pointed segments to a greater or less extent, 2-5 cm. across; disc yellowish-brown, externally yellowish-brown or dingy, densely villose and more or less coated with sand or earth, hairs cylindrical, simple or frequently branched, septate, coloured, elongated and intricately felted, 6-10  $\mu$  thick; asci cylindrical, 8-spored; spores obliquely 1-seriate, smooth, hyaline, continuous, elliptical, ends obtuse,  $18-22 \times 10-12 \mu$ ; paraphyses slender, septate, the brownish apex slightly thickened.

*Peziza sepulta*, Fries, Nov. Symb. Myc., p. 126; Cooke, Mycogr., fig. 112.

*Lachnea sepulta*, Phil., Brit. Disc., p. 209, pl. vi. fig. 39; Sacc., Syll., viii. n. 684.

*Peziza geaster*, B. & Br., Ann. Nat. Hist., nos. 956 and 1162, pl. iv. fig. 26; Cke., Mycogr., fig. 114.

*Lachnea geaster*, Phil., Brit. Disc., p. 210; Sacc., Syll., viii. n. 693.

In the ground.

The type specimens of *P. geaster*, B. & Br., are somewhat smaller in size than specimens of *P. sepulta*, Fr., specimens of which, named and communicated by Fries, are in Herb. Berk., but in other respects the two are identical.

### **Sepultaria arenicola. Mass.**

Ascophore sessile, subterranean, subglobose then expanding, but the margin remains persistently more or less incurved, and usually becomes split and irregularly toothed, 1-2 cm. across; waxy; clothed externally with a dense coat of flexuous, interwoven, septate, brown hairs 4-5  $\mu$  thick; excipulum parenchymatous, cells irregularly polygonal, 15-30  $\mu$  diameter, passing into a closely packed row of parallel, slightly clavate, elongated, septate cells at the margin, olive-brown; disc pale tan-colour or brownish, sometimes with a tinge of pink; asci cylindrical, apex rounded, base narrowed into a pedicel, 8-spored; spores obliquely uniseriate, smooth, hyaline, continuous, broadly elliptical, ends rounded, usually 1-guttulate,  $20-22 \times 11-12 \mu$ ; paraphyses filiform, straight, slightly clavate, 4  $\mu$  thick at the apex.

*Peziza arenicola*, Lév., Ann. Sci. Nat. (1848), vol. ix., p. 140; Cke., Mycogr., p. 66, fig. 118.

*Lachnea arenicola*, Phil., Brit. Disc., p. 210; Sacc., Syll., n. 694.

*Peziza Bloxami*, Cooke, Mycogr., fig. 121.

*Lachnea arenicola*, var. *Bloxami*, Phil., Brit. Disc., p. 211.

In sandy ground.

Subterranean at first, then as the fungus expands, the sand is pushed away and the disc exposed. The outside woolly coat of the fungus is completely covered with particles of sand.

Specimen from Lévêille in Herb. Berk. examined.

Cooke's specimens of *P. Bloxami*, which I have examined, agree exactly in size, structure, and habit with the present species.

### **Sepultaria Sumneriana. Mass.**

Ascophore subterranean, globose, and closed at first, then splitting at the apex into irregular portions, becoming rather broadly expanded, and partly raised above-ground, rather fleshy, 2.5–5 cm. across; disc pale ochraceous with a pinkish tinge, externally brown and densely villose, hairs elongated, wavy, cylindrical, septate, coloured, 7–10  $\mu$  thick; asci cylindrical, 8-spored; spores smooth, hyaline, continuous, elliptical, ends acute, often 2-guttulate, 28–30  $\times$  11–13  $\mu$ ; paraphyses slender, septate, the brown tips clavate.

*Peziza lanuginosa*, var. *Sumneri*, Berk., Linn. Trans., xxv., pl. 55, fig. 1; Cke., Mycogr., fig. 111.

*Lachnea Sumneriana*, Phil., Brit. Disc., p. 213; Sacc., Syll., viii. n. 618.

On the ground, under conifers. Spring.

Distinguished from *S. sepulta* by the large, acute-pointed spores, and by the larger ascophore.

Type specimen examined.

### **Sepultaria semiimmersa. Mass.**

Ascophore 3 mm. up to 1 cm. across, sessile, semi-immersed in the ground, hemispherical then expanded, sometimes becoming almost plane, margin unequal and irregularly torn; disc pale ochraceous with a tinge of dingy flesh-colour or sometimes pale brick-red; externally paler and

slightly pubescent owing to the presence of stout, septate hyphae springing from many of the large cells of the excipulum; asci almost cylindrical, base attenuated, spores 8, obliquely uniseriate, elliptical, smooth, hyaline, usually 1-2 guttulate,  $16-21 \times 9-10 \mu$ ; paraphyses numerous, forming a large curve at the apex, which is only very slightly or not at all thickened, but often showing a slight tendency to become nodulose, sparingly septate or aseptate, colourless, about  $3 \mu$  thick.

*Peziza semiimmersa*, Karsten, Monog. Pez., p. 117; Myc. Fenn., i. p. 45; Cke., Mycogr., f. 46; Phil., Brit. Disc., p. 95.

*Humaria semiimmersa*, Sacc., Syll., n. 568.

On damp naked ground, especially when of a sandy nature. Gregarious and more or less immersed.

Specimen in Karsten's Fung. Fenn. Exs., n. 724, examined.

Very much the colour of the soil, and buried half-way in the ground. The disc is more decidedly flesh-colour. (Phil.)

### *Sepultaria coronaria*. Mass.

Subterranean at first, then bursting through and becoming partly exposed; subglobose and closed at first, then splitting from the apex in a stellate manner into 5-8 pointed teeth which spread or even become reflexed with age, 6-12 cm. across, often furnished with a short, stout, stem-like rooting base; excipulum fleshy, rather brittle, composed of colourless septate, interwoven hyphae, mixed with large vesicular cells; disc varying in colour from dark purple to rosy; externally pallid with tinge of blue or brownish purple, glabrous; asci narrowly cylindrical, very long, apex rounded, 8-spored; spores obliquely uniseriate at the upper part of the ascus, hyaline, smooth, continuous, elliptic-oblong, ends obtuse, often 2-guttulate,  $14-18 \times 7-8 \mu$ ; paraphyses filiform, apex clavate, hyaline.

*Peziza coronaria*, Jacq., Misc., p. 140, t. 10; Sacc., Syll., n. 287; Phil., Brit. Disc., p. 68; Cooke, Mycogr., fig. 238.

*Peziza macrocalyx*, Smith, Journ. Bot., 1869, p. 345, t. 98.

On the ground under trees. Spring.

Specimen in Rehm's Ascom., n. 602; also W. G. Smith's specimen of *P. macrocalyx*, examined.

## CARNOSAE.

A. *Spores globose.*\* *Spores hyaline.***Barlaea.**\*\* *Spores coloured.***Sphaerosoma.** Ascophore persistently subglobose, wrinkled.**Curreyella.** Ascophore plane, even.B. *Spores elliptical or fusiform.*\* *Spores septate.***Masseea.**\*\* *Spores continuous.*† *Ascophore sessile or subsessile.***Humaria.** Ascophore small, rarely 1 cm. across, fleshy, sessile on a broad base.**Peziza.** Ascophore large, 2-10 cm., fleshy, scurfy outside.**Otidea.** Ascophore elongated and split down one side, or vertically incurved and very wavy.\*\* *Ascophore stipitate ; stem stout and longitudinally grooved.***Acetabula.**C. *Ascophore sessile, expanded and crustlike or discoid from the first ; fixed by rhizoids or fibrils springing from the under surface ; spores hyaline, continuous, elliptical or fusiform.***Rhizina.**

## BARLAEA. Sacc.\*

Ascophore sessile, more or less fleshy, closed at first, then gradually expanding until almost or quite plane, glabrous; disc often brightly coloured; cortex parenchymatous; asci cylindrical, 8-spored; spores globose, hyaline, episporium often ornamented; paraphyses present.

*Barlaea*, Sacc., Syll., viii. p. 111.

*Peziza*, of many authors.

Closely resembling *Humaria* in size, habit, and general appearance, but readily distinguished by the perfectly globose spores.

Growing on the ground.

\* *Disc red or orange.*

† *Episporium smooth.*

***Barlaea constellatio*. Sacc., Syll., n. 417.**

Ascophore 2-3 mm. across, sessile, rather fleshy, concave then almost or quite plane, entirely vermilion with a tinge of carmine, margin quite entire, rather thick, similarly coloured; cells of excipulum large, 12-16  $\mu$  diameter, glabrous except for the presence of thick, colourless, septate hyphae near the base of the ascophore; ascus cylindrical above, narrowed below to a narrow, often oblique base; spores 8, globose, hyaline, not usually guttulate, persistently smooth, 11-13  $\mu$  diameter; paraphyses cylindrical, curved at the apex, which contains red granules when fresh, about 1.5-2  $\mu$  thick.

*Peziza constellatio*, B. & Br., Ann. Nat. Hist., n. 1620, ser. 4, vol. xvii. p. 142; Phil., Brit. Disc., p. 86; Cke., Mycogr., fig. 81.

On the ground; gregarious but not crowded.

So far as I have been able to ascertain from an examination of the type and other specimens, the spores remain perfectly smooth at maturity.

Closely resembling *Barlaea cinnabarina* in its early condi-

tion before the spores become reticulated, but distinguished by the much larger cells of the excipulum and smaller spores.

† *Epispore rough*.

**Barlaea Crouani.** Mass.

Ascophore  $\frac{1}{2}$ –1 cm. across, fleshy, sessile, urceolate then hemispherical, at length almost plane, externally and the disc dark orange-red or scarlet; margin membranaceous, more or less jagged, spreading or reflexed, whitish; glabrous, the external large cells of the excipulum giving off stout, colourless, septate hyphae near the base of the ascophore; asci cylindrical above, attenuated below into a narrow base; spores 8, uniseriate, globose colourless, uniguttulate, 16–18  $\mu$  diameter, perfectly smooth for a long time, then furnished with rather strong raised ribs that anastomose to form an irregularly polygonal network, the meshes averaging about 2  $\mu$  diameter; paraphyses straight, gradually increasing in thickness from near the base to form a clavate apex 3–4  $\mu$  thick, septate, sometimes branched.

*Ascobolus miniatus*, Crouan, Ann. Sci. Nat., vol. x. p. 197, t. 13, f. 44–47 (1858).

*Ascobolus Crouani*, Cooke, Journ. Bot., 1864, p. 151, f. 3.

*Peziza Crouani*, Cke., Grev., vol. iii. fig. 61; Cooke, Mycogr., fig. 17; Phil., Brit. Disc., p. 84.

*Barlaea miniata*, Sacc., Syll., n. 416.

On the ground among tufts of moss, and on the top of walls.

Cooke's type specimen examined.

Differs from *B. cinnabarina* in the straight, clavate paraphyses.

**Barlaea Wrightii.** Sacc., Syll., n. 422.

Ascophore about 2 mm. across, sessile, rather fleshy, hemispherical then expanding and becoming almost plane, margin entire, rather thick, every part scarlet, becoming paler when dry; externally minutely papillose, especially when dry, due to unequal contraction of the external cells, otherwise glabrous, cells of epithecium in irregularly parallel rows, much elongated in the direction from base to apex; asci cylindrical, narrowed downwards into a slender



base; spores 8, uniseriate, globose or sometimes with a tendency to become elongated, hyaline, uniguttulate, for a long time quite smooth, eventually minutely but distinctly papillose, 10–12  $\mu$  diameter; paraphyses very gradually becoming clavate from near the base, rather stout, septate, often irregularly nodulose or irregularly branched, 3–4  $\mu$  thick at the apex.

*Peziza Wrightii*, Berk. & Curtis, Ann. Nat. Hist., n. 1064; ser. 3, vol. xv. p. 15, pl. 15, fig. 16; Phil., Brit. Disc., p. 86; Cooke, Mycogr., fig. 18.

Among moss on trunks. Type examined.

Readily distinguished when quite mature by the spores being sparsely ornamented with minute, blunt papillae; during the immature stage, when the spores are smooth, the present species can be distinguished from allies by the stout, irregularly nodulose or branched paraphyses and the cells of the excipulum being elongated in a direction from base to margin. The spores are not echinulate as described and figured by Berkeley and Phillips, the minute warts being very short and blunt.

***Barlaea cinnabarina*.** Sacc., Syll., viii. n. 418.

Ascophore 2–4 mm. across, sessile, fleshy, concave then expanded, margin obtuse, entire, everywhere vermilion with a tinge of carmine, not changing colour; excipulum consisting of rather small-celled parenchymatous tissue, glabrous, basal cells of the excipulum giving origin to stout, septate, colourless hyphae which fix the plant to the soil; spore bearing portion of ascus cylindrical, tapering below to a narrow, usually oblique base; spores 8, uniseriate, globose; hyaline, 1-guttulate, 16–18  $\mu$  diameter, for a long time perfectly smooth, then ornamented with very thin and slightly raised lines that anastomose to form an irregular polygonal network, diameter of mesh about  $2\frac{1}{2}$ –3  $\mu$ ; paraphyses numerous,  $1\frac{1}{2}$   $\mu$  thick, cylindrical, not at all thickened upwards, curved at the apex.

*Peziza laetirubra*, Cooke, Grev., iii. f. 56; Cooke, Mycogr., f. 20; Phil., Brit. Disc., p. 85.

*Crouania cinnabarina*, Fuckel, Symb. Myc., Append. ii. p. 64.

On sandy ground, among moss, &c.

Cooke's type specimen examined, also Fuckel's Fung. Rhen., n. 2481.

The present species is closely allied to *B. Crouani*, but is quite distinct, and readily distinguished by the perfectly cylindrical, slender paraphyses, curved at the apex; the very delicate reticulation on the surface of the mature spore, and the coloured, entire, thick margin of the ascophore. Cooke's specimens are identical with those in Fuckel's exs., n. 2481, and the latter is undoubtedly the species described by Fuckel, whose name has priority.

**Barlaea astroidea.** Sacc., Syll., n. 415.

Ascophore about 1 mm. across, sessile, rather fleshy, concave then almost plane, the whitish ragged margin erect or spreading, disc and externally deep orange-yellow; glabrous with the exception of scattered, colourless, stout septate hyphae originating from the large external cells of the excipulum, and attaching the fungus to the soil; spore bearing portion of ascus cylindrical, tapering below to a narrow, usually oblique base; spores 8, uniseriate, globose, 14–15  $\mu$  diameter, hyaline, 1-guttulate, perfectly smooth for a long time, then covered with exceedingly delicate ridges, anastomosing to form an irregular polygonal network, the meshes averaging 1.5–2  $\mu$  diam.; paraphyses numerous, becoming gradually clavate from near the base, apex about 4  $\mu$  thick, containing coloured granules, septate.

*Peziza astroidea*, Hazslinszky, in Cooke's Mycogr., p. 29, fig. 49.

*Peziza leucoloma*, Karst., Myc. Fenn., i. p. 63.

On the ground among tufts of moss.

I have examined the specimen sent to Dr. Cooke by Professor Hazslinszky of Eperies, and find the spores in several asci are ornamented as described above, in other asci the spores are absolutely smooth. The paraphyses are sometimes more or less curved.

Very closely allied if not identical with *B. Crouani*; the only constant point of difference being in the more delicate nature of the ridges on the surface of the wall of the mature spore in the present species. Examination of a series of living specimens will be necessary to demonstrate the permanency or otherwise of this slender point of distinction.

**\*\* *Disc dingy violet or purple.***

***Barlaea violascens.* Mass.**

Ascophore 4-6 mm. across, sessile, hemispherical then expanding, margin irregularly and minutely jagged; every part of a dingy violet colour; glabrous, usually furnished with whitish thread-like fibres at the base, which is sometimes whitish; excipulum parenchymatous, cells rather large, tinged with violet; asci cylindrical, base attenuated, apex rounded, very long; spores 8, uniseriate, globose, hyaline or often with a violet tinge, smooth, uniguttulate, 8-9  $\mu$  diameter; paraphyses filiform, cylindrical, about 2  $\mu$  thick, often curved at the apex.

*Peziza violascens*, Cke., Mycogr., p. 46, f. 83; Phil., Brit. Disc., p. 88.

*Ascobolus Persoonii*, Crouan, Flor. Finist., p. 56.

*Barlaea Persoonii*, Sacc., Syll., n. 438.

Damp sandy ground among moss.

The dingy violet colour and globose spores characterise the present species.

**\*\*\* *Disc brownish.***

***Barlaea areolata.* Mass.**

Ascophores scattered, sessile, soft and fleshy, closed and globose when young, then expanding and becoming plane or slightly convex, immarginate, glabrous, dark brown, 2-3 mm. across; hypothecium and excipulum parenchymatous, passing at the periphery and margin into parallel, somewhat clavate, septate, brown hyphae; asci cylindric-clavate, apex rounded, base narrowed into a curved pedicel, 8-spored; spores uniseriate, globose, hyaline, ornamented at maturity with thin raised ridges 3-4  $\mu$  high, anastomosing to form an irregular network, 30-36  $\mu$  diameter; paraphyses numerous, septate, becoming gradually clavate upwards from the middle, 7-9  $\mu$  thick at the brown tips, longer than the asci.

*Boudiera areolata*, Cooke, Grev., vol. vi. p. 76, pl. 97, figs. 12-15; Phil., Brit. Disc., p. 285, pl. xi. fig. 53; Sacc., Syll., viii, n. 2125.

On naked ground in damp places.

Type specimen examined, also specimen in Rehm's Ascom., n. 451 (called *Plicaria tracheia*).

Distinguished by the dark brown colour of the ascophore and the large, areolate spores.

The present species is the type of the genus *Boudiera*, founded by Cooke—Grev., vol. vi. p. 76—and which he considered as belonging to the Ascoboleae and allied to *Ascobolus*, differing in the globose spores. In the description of *Boudiera*, Cooke says the hymenium is papillate and the asci exerted; this point I have not been able to corroborate, but I find the paraphyses constantly longer than the spores. The structure of the excipulum differs from that of the Ascoboleae, and would be unique in that group, whereas it agrees well with *Barlaea* and *Humaria*. Phillips says the spores are "deeply areolate, hyaline, brownish;" I have not seen the brown colour in the specimens examined.

***Barlaea schizospora*. Sacc., Syll., iv. n. 442.**

Ascophore sessile, 4-7 mm. across, urceolate then plane, brown with a tinge of red, then brown, disc sometimes paler, margin entire; externally minutely granular or pruinose; cells of excipulum polygonal, thin walled, very large, 30-50  $\mu$  diameter; attached to the matrix by hyaline septate hyphae originating from the basal cells of the excipulum; asci cylindrical, tapering at the base to form a pedicel; spores 8, uniseriate, hyaline, permanently smooth, 1-guttulate, 12-16  $\mu$  diameter; paraphyses stout, septate, expanding into a clavate or pyriform apex 4  $\mu$  thick, and containing brownish granules when fresh.

*Peziza schizospora*, Phil., Grev., vol. iii. fig. 59; Phil., Brit. Disc., p. 87; Cke., Mycogr., f. 80.

On burnt sandy soil, charcoal, &c.

On examining a portion of the type specimen, sent by Phillips to Berkeley, I observed a few free spores corresponding in size with the spores of the present species, but minutely papillose; all the spores, however, that were in the asci, and therefore certainly belonging to this species, were perfectly smooth, and even if it is eventually shown that the spores become ornamented, yet the species will be readily distinguished by the very large, hexagonal cells of the excipulum.

Cup 2 to 3 lines broad; the nucleus of the sporidia become free when the epispore is ruptured. The external cells of the cup differ from those of *hinnulea* (B. & Br.), and it has not any short hairs, as that species has. (Phil.)

### SPHAEROSOMA. Klotzsch.

Ascophore partly subterranean, unequally globose, rather fleshy, entirely closed or with a minute aperture at the apex; internally more or less convolute, hymenium covering the external surface; texture parenchymatous, cells large; asci large, cylindrical, apex rounded, 8-spored; spores 1-seriate, globose, hyaline or brownish, epispore ornamented; paraphyses septate.

*Sphaerosoma*, Klotzsch, in Deitr., Flor. Boruss., n. 467; Sacc., Syll., viii. p. 56.

The present genus was removed by Saccardo—Syll., viii. p. 56—from the Tuberaceae to the Discomycetes on account of its structure being most in accordance with the last named, and in this respect I consider he is certainly right. The genus appears to be intermediate between the two groups, and allied to such true *Pezizae* as *P. vesiculosa*, and more especially to the genus *Sepultaria*.

Growing partly buried in the ground or among heaps of dead leaves.

*Sphaerosoma ostiolatum*. Tul., Fung. Hypog., p. 183, pl. xix., fig. 1; Cooke, Hdbk., p. 746, fig. 351; Sacc., Syll., viii. n. 178.

Irregularly globose, surface nodulose or with wavy folds, internally cavernous and opening at the apex by a small perforation, rather soft, brown, about 1 cm. across; texture parenchymatous, cells irregular, 12–20  $\mu$  diameter; asci cylindrical, apex rounded, 8-spored; spores 1-seriate, globose, pale brown at maturity, the epispore studded with elongated, obtuse, unequal, hyaline warts, 20–22  $\mu$  diameter; paraphyses septate, broadly clavate, longer than the asci.

Under leaves among loose mould.

The adult plant is strongly plicate, and of a rich mulberry brown (B. & Br.).

Specimens in Herb. Berk., Kew, collected by the late C. E. Broome, M.A., near Bristol, examined.

### CURREYELLA. Mass. (u. g.)

Ascophore sessile, fleshy, rather large, expanded at maturity; excipulum pseudoparenchymatous; asci cylindrical, 8-spored; spores globose, 1-seriate, coloured at maturity; paraphyses septate, clavate.

*Peziza*, Currey, Linn. Trans., vol. xxiv. p. 493.

Distinguished by the discoid ascophore and the perfectly globose spores, which in the British species are clear brown, and rather coarsely warted at maturity.

Distinguished from *Detonia*, as defined by Saccardo, by the coloured spores.

*Sphaerosoma* differs in the ascophores being persistently irregularly globose and crumpled.

### Curreyella radula. Mass.

Ascophore sessile, at first globose and closed, becoming expanded and saucer-shaped, rather fleshy, 2–3 cm. diameter, disc brown, or with a red tinge, externally blackish, warted, the warts formed by outgrowths of the large, polygonal, cortical cells; excipulum parenchymatous; asci cylindrical, apex rounded, pedicel short, stout, oblique, 8-spored; spores 1-seriate, globose, warted, pale brown at maturity, 21–23  $\mu$ ; paraphyses rather stout, septate, clavate, tip 5–6  $\mu$  thick.

*Peziza radula*, B. & Br., Ann. Sci. Nat., vol. xviii. p. 77 (1846); Phil., Brit. Disc., p. 71, pl. iv. fig. 17.

*Phaeopezia radula*, Sacc., Syll., viii. n. 1959.

On the ground in woods.

Type specimen examined.

Cup depressed, sessile, nearly an inch across, black externally, broken into nearly equal, distinct, subconical warts, like those of *Genea verrucosa*; hymenium of a dark vinous brown; asci large, obtuse; spores large, globose, rough with obtuse, distinct tubercles; paraphyses septate, with the ultimate articulation clavate. (B. & Br.)

### Curreyella trachycarpa. Mass.

Ascophore at first subglobose and closed, soon becoming



expanded, discoid, and applanate; when old often irregular, recurved, and wavy, very frequently umbilicate, almost sessile or contracted to a short, stem-like base, then more or less obconic; 1-6 cm. across; disc blackish brown, often with an olive or purple tinge, more or less scabrid or tuberculate, externally granulated, dingy brown; excipulum pseudoparenchymatous, peripheral cells largest and running out into irregular groups forming the granular exterior; asci cylindrical, apex rounded, 8-spored; spores globose, 1-seriate, for a long time hyaline and smooth, finally becoming clear pale brown and rather closely covered with blunt warts, 10-14  $\mu$  diameter; paraphyses septate, tips clavate and filled with brown granules.

*Peziza trachycarpa*, Currey, Linn. Trans., vol. xxiv. p. 493, t. 51, figs. 3-5; Cooke, Mycogr., fig. 257; Phil., Brit. Disc., p. 65, pl. iii., fig. 15.

*Detonia trachycarpa*, Sacc., Syll., viii. n. 395.

*Peziza leiocarpa*, Currey, Linn. Trans., vol. xxiv. p. 493, t. 51, figs. 4 and 8; Cke., Mycogr., fig. 256; Phil., Brit. Disc., p. 66.

*Detonia leiocarpa*, Sacc., Syll., viii. n. 394.

On the ground, especially where fires have been.

An examination of the type specimens shows clearly that Currey's *P. leiocarpa* is nothing more than the young stage of his *P. trachycarpa*. The spores are smooth and colourless at first and also smaller than at maturity; every transition from the smooth, hyaline spore to the coarsely warted, brown condition is shown in the specimens.

*C. foveata* (Fckl.) Mass., somewhat resembles *C. trachycarpa* in general appearance, but differs in the globose, pale brown spores being perfectly smooth, 10  $\mu$  diam. At present only known from Germany.

### MASSEEA. Sacc.

Ascophore sessile, somewhat fleshy, concave then becoming plane, glabrous, brightly coloured; excipulum parenchymatous; asci clavate, 8-spored; spores irregularly 2-seriate, elongated, hyaline, 3-5 septate; paraphyses present.

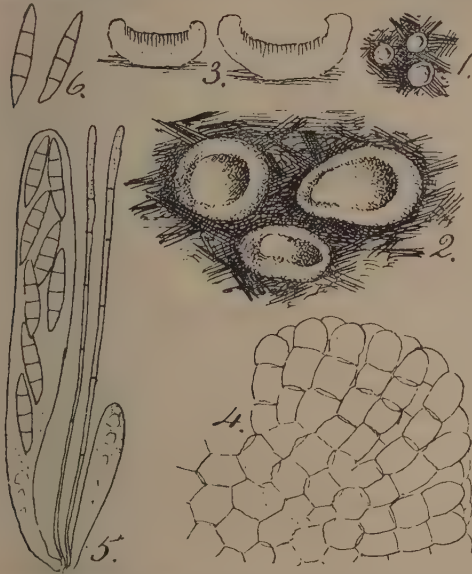
*Masseea*, Saccardo; Syll., viii. p. 488.



Agreeing with *Humaria* in size, habit, and structure of the ascophore, but differing in the septate spores.

**Masseea quisquilarum.** Sacc., Syll., viii. n. 2017.

Ascophores gregarious, sessile, at first globose and closed, then expanding and becoming concave or plane, fleshy, glabrous, clear yellow, 2–3 mm. across; excipulum paren-



*Masseea quisquilarum*, Sacc.—Fig. 1, nat. size;—Fig. 2, ascophores, slightly  $\times$ ;—Fig. 3, sections of same, slightly  $\times$ ;—Fig. 4, portion of excipulum  $\times 400$ ;—Fig. 5, asci and paraphyses,  $\times 400$ ;—Fig. 6, free spores,  $\times 500$ .

chymatous, cells subquadrate or polygonal, 6–8  $\mu$  diameter, running out in more or less parallel series at the surface and margin; asci broadly clavate, apex somewhat truncate, base narrowed into a slender pedicel, 8-spored; spores irregularly 2-seriate, hyaline, narrowly fusiform, straight or

slightly curved, 3-5 septate at maturity,  $23-25 \times 5-6 \mu$ : paraphyses slender, hyaline, scarcely thickened at the tips.

*Peziza quisquilarum*, B. & C., Journ. Linn. Soc., vol. x. p. 366, n. 670.

On fragments of decaying twigs, &c., on the damp ground.

Type specimen examined.

### HUMARIA. Fries.

Ascophore sessile, fleshy, closed at first, finally becoming saucer-shaped or plane; glabrous, at all events for some distance downwards from the margin, the lower portion in some species giving origin to numerous hyphae which form a spreading subiculum; cortical cells polygonal, often running out into parallel, septate hyphae and forming a minutely fimbriate margin; asci cylindrical, 8-spored; spores continuous, hyaline, elliptical or fusiform, obliquely 1-seriate; paraphyses present.

*Humaria*, Fries, Syst. Mys., ii. p. 42 (as a subgenus of *Peziza*); Sacc., Syll., viii. p. 118 (in part).

The species are generally small, rarely reaching 1 cm. in diameter. Closely allied to *Peziza*, which differs more especially in the ascophores being larger, and granular or scurfy externally. *Neottiella* differs in being distinctly villose or downy outside. The species of *Tapesia* agree with certain members of the present genus in having a tapesium, but are distinguished by growing on wood. The species of *Mollisia* also grow on plants.

Growing on the ground.

\* *Disc red, orange-red, or yellowish.*

**Humaria Chateri.** Sacc., Syll., viii. n. 457.

Densely caespitose, rarely scattered, sessile, fleshy; closed at first, then expanded; margin erect or slightly incurved, minutely fimbriate, dark brown; disc deep orange-red or crimson, externally pale reddish-brown,  $\frac{1}{2}$ -1 cm. across, often irregular in form from mutual pressure; hypothecium and excipulum parenchymatous, cortical cells irregularly poly-

gonal, running out at the margin into parallel, crowded, clavate, obtuse, 3-5-septate, reddish-brown hyphae slightly constricted at the septa,  $30-45 \times 7-9 \mu$ ; asci cylindrical, apex slightly truncate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, epispore minutely reticulated,  $13-16 \times 7.8 \mu$ ; paraphyses septate, tips slightly clavate and containing red granules.

*Peziza Chateri*, W. G. Smith, Gard. Chron., 1872, p. 9, with fig.; Cooke, Mycogr., fig. 62; Phil., Brit. Disc., p. 89.

On damp paths, road-scrappings, &c.

A very beautiful and distinct species. I have seen it covering the sides of a damp path and extending for more than a hundred yards, showing as a crimson streak at a considerable distance away.

**Humaria humosa.** Sacc., Syll., viii. n. 458.

Gregarious, sessile, fleshy, closed at first, then expanding until saucer-shaped or almost plane, glabrous, margin rounded, thick; disc blood-red, 3-5 mm. across; cortex parenchymatous; asci cylindrical, apex truncate, 8-spored; spores obliquely 1-seriate, smooth, hyaline, continuous, broadly elliptical, ends obtuse, often 2-guttulate,  $19-22 \times 10 \mu$ ; paraphyses slender, slightly clavate, sometimes branched.

*Peziza humosa*, Fries, Obs. Myc., p. 309; Cke., Mycogr., fig. 25; Phil., Brit. Disc., p. 92.

On the naked ground in damp places.

Specimen in Cooke, Fung. Brit., n. 475, examined.

**Humaria haemastigma.** Mass.

Gregarious, sessile, closed at first, then gradually expanding until plane or slightly convex, glabrous, rather fleshy, about  $\frac{1}{3}$  mm. across, vermilion to carmine, margin entire; asci cylindrical, apex obtuse, 8-spored; spores hyaline, continuous, broadly elliptical, ends obtuse, smooth,  $18-20 \times 10-12 \mu$ , 1-seriate; paraphyses rather stout, septate, apex very slightly clavate,  $4 \mu$  thick; cortex parenchymatous, cells irregularly polygonal, 6-8  $\mu$  diameter.

*Octospora haemastigma*, Hedwig, Musc. Frond., t. 5, fig. B.

*Peziza haemastigma*, Phil., Brit. Disc., p. 107; Cooke, Mycogr., fig. 70.

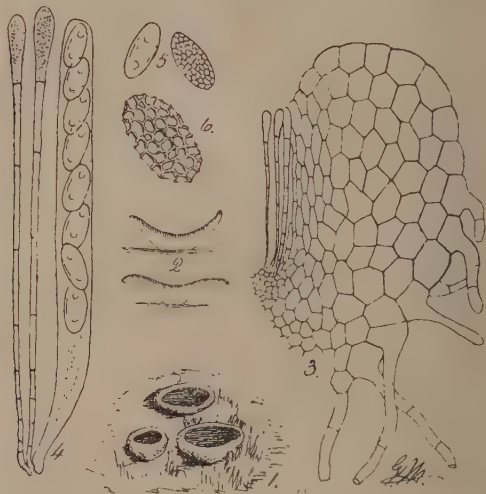
*Pyronema haemastigma*, Sacc., Syll., viii. n. 405.

On whitewashed walls and on mortar.

Distinguished by the minute, almost blood-red ascophore, large elliptical spores, and habitat.

Specimen collected at Pen-y-Gwryd, by Broome, and now in Herb. Berk., Kew, accepted as typical.

**Humaria rutilans.** Sacc., Syll. viii., n. 518; Rehm, Krypt.-Flora, Disc., p. 960; figs. 1-4, p. 918.



*Humaria rutilans*, Sacc.—Fig. 1, group of fungi, natural size;—Fig. 2, sections, natural size;—Fig. 3, section of excipulum;—Fig. 4, ascus with spores and paraphyses;—Fig. 5, free spores in various stages of development;—Fig. 6, spore showing structure of episphore at maturity. Figs. 3-5,  $\times 400$ ; fig. 6  $\times 800$  (drawn from specimen named by Fries).

Ascophore sessile, attached by a very short central point, subglobose and closed at first, then expanding and becoming quite plane, fleshy, margin entire, sometimes slightly raised, at others somewhat drooping;  $\frac{1}{4}$ -1 cm. across; disc orange-red or sometimes almost crimson, externally paler and below the margin very minutely downy; excipulum parenchymatous,

cells irregularly polygonal, large, cortical cells, 12–16  $\mu$  diameter; asci cylindrical, narrowed at the base into a slender, often curved pedicel, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, ends blunt, often 2-guttulate, at first smooth, finally very minutely reticulated, 13–15  $\times$  8–9  $\mu$ ; paraphyses septate, slender, often branched below, apex clavate, 6–8  $\mu$  thick, containing orange granules.

*Peziza rutilans*, Fries, Syst. Myc., ii. p. 68 (1823) (not of Phil., Brit. Disc.).

Specimen named by Fries, and now in Kew Herbarium, examined.

On the ground among moss, &c.

Sometimes solitary, at others gregarious, fleshy, brittle. Fries placed *P. rutilans* in his tribe Humaria, of which he says, "Cupula nec pruinosa, neque vere villosa," Syst. Myc., ii. p. 67, hence it is somewhat remarkable that it should have been confounded with the species called *P. polytrichi*, which is truly villose.

The present species has been confused with *Neottiella polytrichi* (Schum.) in this country. For synonymy and consultation of exsiccati relating to the two species mentioned, see "*Grevillea*," vol. xxi. p. 107.

### *Humaria Piggotti*. Sacc., Syll., viii. n. 545.

Gregarious or crowded, sessile, seated on a thin, downy white hypothecium, subglobose and closed at first, then saucer-shaped, rather fleshy, 3–4 mm. across, disc pale brick-red, externally paler; hypothecium and excipulum formed of branched, irregularly swollen hyphae often thickened at the point of bifurcation; these hyphae become denser at the periphery or cortex, and give origin below the margin to slender, branched, aseptate hyphae, which attach the fungus to the substratum, and also form the thin subiculum; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, elliptical, ends blunt, 15–17  $\times$  8–9  $\mu$ ; paraphyses numerous, very slender, not thickened at the tips.

*Peziza Piggottii*, B. & Br., Ann. Nat. Hist., n. 769; Phil., Brit. Disc., p. 106.

On plaster ceiling.

Mycelium white, downy, but not spreading very widely,

running up the base of the hemispherical or cyathiform cups, which are about 2 lines broad, margin generally acute. (B. & Br.)

Distinguished at once by the peculiar structure of the hypothecium and excipulum.

Type specimen examined.

**Humaria convexula.** Quélet, *Enchir. Fung.*, p. 288; *Sacc., Syll.*, viii. n. 547.

Scattered, sessile, somewhat immersed, plane then rather convex, slightly marginate, fleshy, soft, glabrous, reddish-yellow or ochraceous with a tinge of flesh-colour, sometimes dull orange, 1–2 mm. across; hypothecium and excipulum formed of strings of stout sausage-shaped cells, constricted at the distant septa and often branched, cortex parenchymatous; asci cylindrical, apex rounded, 8-spored; spores 1-seriate, hyaline, continuous, smooth, 1–2-guttulate, elliptical, ends rather acute,  $22\text{--}25 \times 10\text{--}12 \mu$ ; paraphyses slender, septate, tips clavate, 6–8  $\mu$  thick, and containing reddish oil-globules.

*Peziza convexula*, Pers., *Obs. Myc.*, ii. p. 85; *Mycogr.*, fig. 36; *Phil.*, *Brit. Disc.*, p. 95.

*Peziza chrysophthalma*, Gerard, *Bull. Torrey Club*, vol. iv. n. 12.

On naked soil, also among moss.

Specimen in Fuckel's *Fung. Rhen.*, n. 1875; a specimen in *Herb. Cooke*, Kew, from Gerard, also examined.

**Humaria pilifera.** *Sacc., Syll.*, viii. n. 464.

Scattered, sessile, hemispherical and closed at first then expanding until almost plane, rather fleshy, 1–2.5 mm. across, margin erect or very slightly incurved, minutely fimbriate, pale, disc orange-red; externally similar in colour, and sprinkled with very delicate, thin-walled, septate hairs which become more numerous downwards; cortex parenchymatous, cells irregularly polygonal, 10–18  $\mu$  diameter; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, continuous, hyaline, smooth, broadly elliptical, ends blunt, 1-guttulate,  $15\text{--}18 \times 9 \mu$ ; paraphyses slender, septate, often branched, clavate and filled with orange oil-globules at the apex, which is sometimes bent.

*Peziza pilifera*, Cooke, Mycogr., p. 50; fig. 92; Phil., Brit., Disc., p. 93.

*Leucoloma ascoboloides*, Rehm, Ascom., n. 54 (not *P. ascoboloides*, Mont., nor De Not., nor of Schweinitz).

On sandy ground, often among moss.

Somewhat approaching the genus *Neottiella*, but appearing to have more affinity with certain species of *Humaria*, as *H. omphalodes*, *H. subhirsuta*, &c. The external hairs are exceedingly delicate and cobweb-like, and are difficult to see in dried specimens.

Specimens examined in Rehm's Ascom., nos. 54 and 854.

***Humaria carbonigena*.** Sacc., Syll., viii. n. 506.

Gregarious or usually densely crowded and irregular from mutual pressure, sessile and applanate; disc plane or slightly convex, often undulate, orange-yellow, sometimes pale yellow or with a tinge of brown, externally paler, extreme margin brownish; rather fleshy, 3–8 mm. across; hypothecium and excipulum formed of interwoven, hyaline, septate hyphae which are inflated into large pyriform or subglobose cells at intervals, and passing into a parenchymatous cortex, of irregular, polygonal cells 10–18  $\mu$  broad, these run out at the margin into short, obtuse, septate, brown hyphae; numerous brown or sometimes almost hyaline, septate hyphae spring singly or in clusters from the cortical cells, and attach the fungus to the substratum; asci cylindrical, apex slightly truncate, 8-spored, spores obliquely 1-seriate, hyaline, elliptical, ends rather acute, usually 2-guttulate, 19–22  $\times$  9–11  $\mu$ ; paraphyses septate, containing orange granules, clavate tip 6–7  $\mu$  thick.

*Peziza carbonigena*, Berk., Flora Tasm., ii. p. 274; Cooke, Mycogr., fig. 29; Phil., Brit. Disc., p. 103.

On charcoal-beds, scorched places, &c.

Type specimen examined.

The species was founded on specimens from Tasmania, with which British specimens agree in every respect. The colour of the disc varies from pale, clear yellow, through orange-yellow, to yellowish brown, or even a tinge of flesh-colour. Sometimes the specimens do not as a rule exceed 2 mm. in diameter, at others they average much more.



*Var. fusispora*, Mass.

Ends of the spore acute; cortical cells 30–45  $\mu$  diameter; hyphae springing from the cortical cells mostly hyaline, and forming a delicate white down round the ascophore; in other respects as in typical form.

*Peziza fusispora*, Berk., Hook. Journ., 1846, p. 5; Phil., Brit. Disc., p. 103; Cooke, Mycogr., fig. 32.

*Humaria fusispora*, Sacc., Syll., n. 520.

On charcoal, also among heather.

Type examined.

*Var. aggregata*, Mass.

Ascophores densely gregarious, narrowed at the base, orange, surrounded at the base with white down, 1–1½ mm. across; otherwise as in typical form.

*Peziza aggregata*, Berk. & Broome, Ann. Nat. Hist., n. 1155.

*Peziza fusispora*, var. *aggregata*, Phil., Brit. Disc., p. 104.

*Humaria aggregata*, Sacc., Syll., viii. n. 521.

On heathy ground.

Type examined.

*Var. Scotica*, Rab., Phil., Brit. Disc., p. 104.

Varying from nearly white to orange or blood-red.

On heath and turfy ground.

Not seen.

*Humaria omphalodes*. Mass.

Crowded, often forming crust-like expansions, sessile, seated on a white tomentose subiculum which is very conspicuous when fresh, somewhat conical or cylindrical when young, then becoming plane or slightly convex, rather fleshy, about 1 mm. across, orange-yellow, orange-red, or pinkish; cortex parenchymatous, cells irregularly polygonal, 6–9  $\mu$  diameter, giving origin below the margin to hyaline, septate, branched hyphae which form the subiculum; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, smooth, elliptical, ends obtuse, 11–13  $\times$  6  $\mu$ ; paraphyses slender, septate, slightly thickened at the tips.

*Peziza omphalodes*, Bull., Champ. Fr., p. 264, t. 485, f. 1; Phil., Brit. Disc., p. 106; Cooke, Mycogr., fig. 65.

*Pyronema omphalodes*, Sacc., Syll., viii. n. 400.

On burnt ground, charcoal, and cinders.

Colour of ascophore variable, orange, reddish, or pink. The spores appear to be a little larger in Continental than British specimens. The subiculum is more evident in the present than allied species.

Specimens examined in Phil., Elv. Brit., n. 109, and Fuckel, Fung. Rhen., n. 1218.

**Humaria melaloma.** Mass.

Caespitose or gregarious, sessile, closed at first, then gradually expanding until almost plane, rather fleshy, 3-4 mm. across, often wavy or distorted from lateral pressure; dingy orange, margin minutely irregular, darker; cortex parenchymatous, cells irregularly hexagonal, 8-12  $\mu$  across, running out at the margin into tufts of cylindric-clavate, obtuse, usually 1-2-septate, brown hairs, 30-40  $\times$  7-10  $\mu$ ; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptic-oblong, ends obtuse, usually 2-guttulate, 15-18  $\times$  8  $\mu$ ; paraphyses slender, septate, slightly clavate.

*Pyronema melaloma*, Fckl., Symb. Myc., p. 319; Sacc., Syll., viii. n. 401.

*Peziza melaloma*, Cke., Mycogr., fig. 67; Phil., Brit. Disc., p. 109.

On the ground, especially where burnt.

Near to *H. subhirsuta* but differing in the dingy colour of the ascophore; darker, minutely irregular margin, and in the paraphyses not originating in clusters. Patouillard considers the present to be distinct from the *Peziza melaloma* of Persoon; this I have no means of ascertaining; it is certainly *Pyronema melaloma* of Fckl., Fung. Rhen., n. 1221.

**Humaria macrocystis.** Sacc., Syll., viii. n. 467.

Ascophores gregarious or scattered, sessile, cup-shaped then almost plane, margin entire, slightly raised, glabrous; disc slightly concave, orange-red, externally brownish, glabrous above, furnished with numerous septate, coloured hyphae springing from the basal cells of the excipulum, and fixing the plant to its substratum; excipulum parenchymatous, inner cells small, cortical ones large, mostly hexagonal, up to 35  $\mu$  diameter; asci cylindrical, 8-spored: spores hyaline, elliptic-oblong, smooth, usually 2-guttulate,

18–20  $\times$  8–9  $\mu$ ; paraphyses septate, the clavate tips filled with orange granules when fresh.

*Peziza macrocystis*, Cooke, Mycogr., fig. 63; Phil., Brit. Disc., p. 91.

*Peziza subhirsuta*, var. *macrocystis*, Cooke, Grev., vol. i. p. 129.

On burnt ground.

Type specimen examined, also specimens in Cooke, Fung. Brit., ed. ii. n. 651, and Phil., Elv. Brit., n. 59.

***Humaria axillaris*.** Sacc., Syll., n. 507.

Ascophore about 1 mm. across, sessile, fleshy, disc only slightly depressed, orange; margin thick, obtuse; externally similarly coloured, base paler, glabrous except towards the base where stout septate colourless hyphae spring from the cells of the excipulum, and attach the fungus to the moss on which it grows; asci cylindrical, apex obtuse, base narrowed into a pedicel; spores 8, obliquely uniseriate, hyaline, smooth, elliptical, ends obtuse, usually with 1–2 large guttulae, 17–24  $\times$  7–10  $\mu$ ; paraphyses numerous, slender, apex slightly clavate and filled with orange granules when fresh.

*Peziza axillaris*, Nees, Syst., p. 258, f. 267; Phil., Brit. Disc., p. 93.

In the axil of the leaves of several species of moss.

*This species is evidently a Mollisia, and is placed here by mistake.*

The fungus is probably a true parasite, as it occurs on living mosses, seated in the axil of a leaf, and attached by stout white hyphae. The spores are variable in size, but I have not found them so small as indicated by Phillips, either in British or continental specimens.

***Humaria ollaris*.** Sacc., Syll., viii. n. 513.

Gregarious or usually crowded, sessile, closed and hemispherical at first, then expanded and more or less plane, up to 1½ cm. across; disc orange-yellow, externally paler, margin minutely downy, especially when young, due to the presence of cylindrical, obtuse, septate hairs, 12–18  $\mu$  thick; excipulum composed of radially parallel septate hyphae, passing into parenchyma of large polygonal cells at the cortex; asci cylindrical, 8-spored; spores obliquely 1-seriate,

hyaline, smooth, usually 1-2-guttulate, rather narrowly elliptic-fusoid, ends rather acute,  $26-30 \times 8 \mu$ ; paraphyses septate, the strongly clavate apex  $8-10 \mu$  thick.

*Peziza ollaris*, Fries, Syst. Myc., ii. p. 68; Cooke, Mycogr., fig. 56; Phil., Brit. Disc., p. 102.

On the ground among moss, in plant-pots, &c.

The present species hovers between *Humaria* and *Neottiella*, agreeing with the last-named in having soft, thin-walled, septate hairs at the margin, especially when young, afterwards becoming almost or quite glabrous. The above description covers what is, in the opinion of Berkeley, Cooke, and Phillips, the true *P. ollaris* of Fries, which is described as follows in Syst. Myc., ii. p. 68:—

Closely gregarious, without a trace of a stem, fleshy-waxy, fragile, hemispherical, at length expanded, and oblong or wavy from mutual pressure; externally naked, but when young the margin is furnished with fascicles of whitish, inflexed hairs. When young 2-4 lines, at length up to 1 in. broad. Very frequent in Swedish pine woods among moss and fallen pine leaves. Summer and autumn. (Fries.)

[*Humaria roumegueri*. Sacc., Syll., viii. n. 515.

Gregarious, sessile, fleshy, orbicular, margin distinct, thin and membranaceous, erect, paler than the clear orange-yellow disc, externally pale yellow, glabrous, 3-4 mm. diameter; hypothecium formed of stout, interlaced hyphae; excipulum parenchymatous, cortical cells large, somewhat hexagonal,  $20-35 \mu$  diameter; asci cylindrical, 8-spored; spores obliquely 1-seriate, smooth, hyaline, usually 1-2 guttulate, elliptic-fusoid, ends narrowed,  $24-27 \times 9 \mu$ ; paraphyses slender, apex rather abruptly and strongly clavate and often curved, filled with orange granules when fresh.

*Peziza roumegueri*, Karsten, Grevillea, vol. vii. p. 65.

On damp earth.

Specimen from Karsten examined.

Karsten states that this species is distinguished from allies—*H. fusispora*, Berk.—by the paraphyses alone becoming blue with iodine; this reaction, however, I find is not evident after the specimen has once been dried.

The typical form, as described above, has not been col-

lected in Britain, but is included, as the following variety is British.]

*Var. carnosissima.* Phil., Brit. Disc., p. 104.

Ascophores cylindrical, sessile, crowded, very fleshy, rather cylindrical in form, apex truncate, almost immarginate, orange-yellow, glabrous, about 1 mm. across, spores  $16-20 \times 6-7 \mu$ ; paraphyses only very slightly thickened at the tip, otherwise as in the typical form.

On decaying vegetable matter.

Specimen in Elv. Brit., n. 158, examined.

Cup  $\frac{1}{2}$  a line across. Much crowded; disc barely depressed, so that the cups can hardly be called cups except in outline, being fleshy to the top. They have no erect, thin, membranaceous margin, as the type has, nor are the apices of the paraphyses clavate. The cells of the exterior of the cup are moderate-sized— $20-30 \mu$  diam. (Phil.)

*Humaria granulata.* Sacc., Syll., n. 503.

Ascophore 1–3 mm. across, gregarious or scattered, sessile, globose then almost or quite plane, rather fleshy and soft; disc deep orange or brick-red, externally paler and granulose or wrinkled, otherwise glabrous; asci cylindrical, narrowed at the base into a short, usually oblique pedicel, dehiscing by a minute lid at the apex, which remains attached on one side, spores 8, obliquely uniseriate, elliptic-oblong, ends obtuse, eguttulate, smooth, hyaline, size variable,  $15-20 \times 8-10 \mu$ ; paraphyses very stout, broadly clavate,  $5-6 \mu$  thick at the apex, which is filled with red granules, septate, especially towards the base.

*Ascobolus granulatus*, Fekl., Symb. Myc., p. 285.

*Peziza granulata*, Bulliard, Champ. Fr., p. 258, t. 433, f. 3; Phil., Brit. Disc., p. 94; Cooke, Mycogr., f. 59.

On cow and horse dung.

Developing during the autumn and winter; often almost covering the dung. Differs from *Lachnea stercorea*, Gill., in the absence of the large marginal hairs; the latter also develops at a different season of the year—spring and summer. The present species shows very clearly the mode of dehiscence of the asci by an apical lid, which remains attached to the ascus on one side after the spores have escaped, agreeing in this respect with many of the *Ascoboleae*.

The paraphyses are remarkably stout, clavate, distinctly septate, and filled with orange-red granules upwards.

**Humaria maurilabra.** Sacc., Syll., n. 474.

Scattered, sessile, fleshy, concave, up to  $\frac{1}{2}$  cm. across; excipulum parenchymatous, cells large, irregularly polygonal, external ones brown,  $15-25\ \mu$  diameter, running out at the margin into parallel, obtuse, septate, brown hyphae that are more or less fasciculate, giving the margin a slightly crenulate appearance; numerous thick, elongated, branched and septate brown hyphae spring from the lower cells of the excipulum, and attach the fungus to the matrix; disc flesh-red or almost orange; asci cylindrical, apex rounded, 8-spored; spores elliptic-oblong, ends obtuse, smooth, hyaline, continuous, usually 2-guttulate,  $15-20 \times 7-8\ \mu$ , uniseriate, paraphyses filiform, apex clavate, orange,  $4-5\ \mu$  thick, rarely forked above.

*Peziza maurilabra*, Cooke, Grev., vi. p. 64; Cke., Mycogr., fig. 388; Phil., Brit. Disc., p. 94.

On chips and on the ground.

Type specimen examined.

This somewhat resembles *P. melaloma* (A. & S.), but the external cells and margin are distinctly different. (Cooke.)

**Humaria glumarum.** Sacc., Syll., viii. n. 504.

Ascophores gregarious or crowded, sessile, but attached by a central point; when young globose and closed, externally covered with delicate white down; glabrous and expanded, slightly concave or nearly plane when mature, often wavy, disc orange-yellow, margin rather torn or irregular, whitish, 5-8 mm. broad; cortical cells rather large, polygonal, excipulum parenchymatous; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptic-oblong, ends obtuse, smooth, straight,  $16-18 \times 9-10\ \mu$ ; paraphyses septate, becoming gradually clavate upwards.

*Peziza glumarum*, Desm., Ann. Sci. Nat., vol. xv. p. 129 (1841); Phil., Brit. Disc., p. 97.

On chaff. Spring.

Specimen in Desm., Cr. France, ser. i., n. 1054, examined.

The present species should be included in the genus *Mollisia*.



***Humaria subhirsuta*. Mass.**

Gregarious or crowded, sessile, closed at first, then gradually expanding until almost plane, margin entire, thickish, rather fleshy; disc clear but rather pale orange-yellow, externally paler, 3-4 mm. across; cortex parenchymatous, cells irregularly polygonal, 8-14  $\mu$  diameter, the external ones giving origin to septate, thin-walled, hyaline hyphae that fix the plant to the ground, a few scattered, short hyphae are present on the above-ground part of the exterior of the ascophore; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, continuous, hyaline, broadly elliptical, ends obtuse, 17-18  $\times$  10  $\mu$ ; paraphyses slender, septate, cylindrical or very slightly thickened at the apex, orange, remarkable for springing in clusters of 4-10 from a common basal cell.

*Peziza subhirsuta*, Schmn., Flora Danica. t. 1787, fig. 1; Phil., Brit. Disc., p. 108; Cooke, Mycogr., fig. 66 (colour too dingy).

*Pyronema subhirsutum*, Sacc., Syll., viii. n. 403.

On the ground in damp places.

Characterised by the paraphyses springing in clusters from a common cell near the base.

Specimens in Rabenh.-Winter, Fung. Eur., n. 2748, examined.

***Humaria xanthomela*. Sacc., Syll., n. 495.**

Ascophores gregarious, sessile, but narrowed to a very short, stout, stem-like base, rather fleshy, 2-4 mm. across, soon plane or slightly convex, disc yellow, externally blackish brown and minutely rough, owing to the dark-coloured, projecting ends of hyphae which are more or less clustered in groups; excipulum and hypothecium formed of slender, hyaline, interwoven hyphae; asci narrowly cylindrical, 8-spored; spores obliquely 1-seriate, continuous, hyaline, smooth, elliptical, ends obtuse, 10-12  $\times$  5-6  $\mu$ ; paraphyses cylindrical, very slender, sometimes branched.

*Peziza xanthomela*, Pers., Syn. Fung., p. 665; Cooke, Mycogr., fig. 41; Phil., Brit. Disc., p. 97.

On the ground on decayed pine leaves, also on rotten pine wood.

Readily distinguished by the peculiar structure of the



ascophore, and the rough exterior departing in these points from the typical structure of *Humaria*. The mature ascophores resemble superficially the apothecia of some lichens.

Specimen in Rehm's *Ascom.*, n. 403, examined.

**\*\* *Dingy purple or violet.***

***Humaria Phillipsii*.** Cke., *Mycogr.*, p. 48, fig. 88; *Sacc.*, *Syll.*, viii. n. 553.

Scattered, fleshy, sessile, globose then concave, finally expanding,  $\frac{1}{2}$ –1 cm. across, disc blackish-purple; externally a little paler, margin often rather irregular; subiculum parenchymatous, cells more or less circular or polygonal, 10–18  $\mu$  diameter, internally with a lilac tinge; asci cylindrical, apex rounded, 8-spored; spores obliquely uniseriate, elliptical, ends rather acute, hyaline, continuous, coarsely warted, warts hemispherical,  $24\text{--}28 \times 11\text{--}12 \mu$ ; paraphyses slender, septate, apex clavate, 4–5  $\mu$  thick, tinged lilac.

*Peziza Phillipsii*, Cke., in Phillips, *Brit. Disc.*, p. 90.

*Ascobolus amethystinus*, Phil., *Grev.*, iv. p. 84.

On damp sandy ground.

Type specimen examined.

***Humaria violacea*.** *Sacc.*, *Syll.*, viii. n. 597.

Ascophores gregarious, subsessile, contracted into a very short, stout base; fleshy and succulent, brittle, closed and almost globose when quite young, then becoming saucer-shaped, finally expanded with the disc more or less undulate and the margin wavy; disc dark brown with a violet tinge, the violet colour becoming more pronounced as the fungus dries; outside pale violet near the margin, covered with a dense white down near the base, 1–2.5 cm. across; hypothecium composed of interwoven hyphae, which pass in the excipulum into subglobose cells 25–35  $\mu$  diameter, but mixed with hyphae and inflated cells, cortex parenchymatous, cells small; asci cylindrical, apex truncate, base stout, often somewhat bulbous, 8-spored; spores obliquely uniseriate, hyaline, smooth, continuous, elliptic-oblong, ends obtuse, usually 2-guttulate,  $12\text{--}14 \times 7\text{--}8 \mu$ ; paraphyses slender, apex often rather wavy, clavate, yellowish-brown.

*Peziza violacea*, Persoon, Syn. Fung., p. 639; Phil., Brit. Disc., p. 81.

On the ground, especially where fires have been, or on charcoal. Persoon says it also occurs on rotten trunks.

Specimen named by Fries examined; also specimens determined by Berkeley.

Very beautiful specimens of this species were found on burnt ground in Wyre Forest, near Worcester, by Mr. Carleton Rea. When quite young the fungus is almost black, afterwards becoming umber-brown, with just a tinge of violet; as the fungus loses moisture the violet colour becomes more decided; but apparently always toned down with brown. When fully developed, large specimens spread out close to the ground, surface more or less wavy or nodulose, and the margin irregular.

*Humaria exidiiformis*. Sacc., Syll., n. 468.

Gregarious or almost confluent, fleshy, sessile, but fixed by a narrowed base, orbicular, becoming almost plane, up to 4 mm. across, entirely dingy purple, glabrous; disc rugulose, the wrinkles often anastomosing; excipulum parenchymatous, cells polygonal, 12–18  $\mu$  diameter; asci cylindrical, apex somewhat truncate, 8-spored; spores broadly elliptical, hyaline, continuous, uniseriate, smooth, often 2-guttulate, 15–17  $\times$  10  $\mu$ ; paraphyses filiform, apex slightly clavate, hyaline.

*Peziza exidiiformis*, B. & Br., Ann. Nat. Hist., n. 1480; Phil., Brit. Disc., p. 81.

On silver sand and very rotten wood.

Type specimen examined.

The present species is not a good *Humaria* nor *Peziza*, the base is too much narrowed; when moist it is rather gelatinous, and contracts very much, and becomes rigid when dry, almost suggesting *Ombrophila*. Examination of living specimens will alone settle this point satisfactorily.

*Humaria hepatica*. Sacc., Syll., viii. n. 554.

Gregarious, sessile, fleshy and watery when fresh, contracted and concave when dry; globose and closed at first, then expanding until saucer-shaped or almost plane, dingy purplish-brown 2–4 mm. across; cortex parenchymatous, cells irregularly polygonal, 12–25  $\mu$  across, running out in

clusters, making the exterior minutely granular and the margin irregular; asci cylindrical, apex somewhat truncate, 8-spored; spores hyaline, smooth, continuous, elliptical, ends rounded,  $20-23 \times 10-12 \mu$ , obliquely 1-seriate; paraphyses septate, sometimes nodulose, slightly clavate.

*Peziza hepatica*, Batsch, Elench., fig. 138; Cooke, Mycogr., fig. 85; Phil., Brit. Disc., p. 99.

On the ground, and on rabbit's dung. Spring.

Distinguished by the purple-brown or liver-coloured ascophore.

Specimen in Cooke's Fung. Brit., ed. ii. 191.

***Humaria purpurascens*.** Sacc., Syll., viii. n. 476.

Scattered or gregarious, narrowed into a more or less distinct, short, stout, stem-like base, campanulate then expanded, fleshy, glabrous, often somewhat irregular in outline, entirely dingy livid-purple, 1-2 cm. across, flexible and rather inclined to be gelatinous when moist; excipulum and hypothecium formed of interwoven hyphae, which run out, especially at the margin, into parallel, septate, obtuse, closely packed, purple-tinged hyphae; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, ends obtuse, usually 2-guttulate,  $18-21 \times 7 \mu$ ; paraphyses slender, slightly clavate.

*Peziza purpurascens*, Pers., Myc. Eur., p. 242, t. 12, fig. 10; Phil., Brit. Disc., p. 97; Mycogr., fig. 276.

On the ground.

Not a typical *Humaria*, exceptional in the structure of the ascophore, and the flexible rather than brittle substance.

Specimen in Cooke's Fung. Brit., ed. ii., n. 543, examined

\*\*\* *Entirely dingy green.*

***Humaria jungermanniae*.** Sacc., Syll., viii. n. 584.

Ascophore 1-2 mm. across, sessile, fleshy, every part deep verdigris green, convex then almost plane, quite glabrous, excipulum composed of small parenchymatous cells; asci clavate, attenuated below into a thin pedicel; spores 8, uniseriate or often irregularly biserial upwards, smooth, hyaline or tinged with green at maturity, guttulate,  $15-18 \times 8-9 \mu$ ; paraphyses numerous, about  $1.5 \mu$  thick below;

apex clavate, sometimes constricted in a beaded manner, deep green, often branched.

*Peziza jungermanniae*, Nees, in Fries, Syst. Myc., ii. p. 144; Phil., Brit. Disc., p. 101; Cooke, Mycogr., fig. 87.

*Ascobolus jungermanniae*, B. & Br., Ann. Nat. Hist., n. 1082, t. 16, f. 23.

On the ground among hepatics.

Resembling *Chlorosplenium aeruginosum* in colour, but distinguished by structural characters, and in growing on the ground. The spores are sometimes slightly clavate or irregularly elliptical. The apex of the ascus is irregularly torn during dehiscence. Corrugated and blackish green when dry.

\*\*\*\* *Disc salmon-colour.*

*Humaria salmonicolor*. Sacc., Syll., n. 470.

Gregarious; sessile, concave then plane or slightly convex and with the margin adpressed, fleshy, about 3 mm. across, glabrous; disc salmon-colour; excipulum tinged red, parenchymatous, cells irregularly circular, 12–20  $\mu$  diameter; asci rather broadly clavate, narrowed to a slender base, 8-spored; spores irregularly 2-seriate above, 1-seriate below, smooth, hyaline, continuous, elliptical, ends obtuse, 18–22  $\times$  10–12  $\mu$ ; paraphyses slender, septate, apex slightly clavate.

*Peziza salmonicolor*, B. & Br., Ann. Nat. Hist., n. 1158, t. iv., fig. 19; Cooke, Mycogr., fig. 48; Phillips, Brit. Disc., p. 98.

Damp ground, sides of ditches, &c.

Type specimen examined.

A fine species, well marked by the broadly clavate ascus having the spores irregularly 2-seriate in the upper portion; the plane or slightly concave disc, and large cells of the excipulum, from which stout, hyaline, septate, branched hyphae are given off near the base.

*Humaria Keithii*. Sacc., Syll., viii. n. 472.

Minute, gregarious or crowded, sessile, fleshy, turbinate, then expanded, dull salmon-colour, glabrous; disc nearly plane, margin obtuse; asci cylindraceo-clavate; spores 8, oblong-elliptic, smooth, 15–18  $\times$  7  $\mu$ ; paraphyses scarce or none.

*Peziza Keithii*, Phil., Myco. Scot., p. 308; Brit. Disc., p. 98.

This species has an outline much commoner amongst the *Ascoboli* than the *Pezizae*, being thick and fleshy, the disc only slightly depressed, the plant forming a flattened sphere.

Unknown to me. The above description is from Brit. Disc., p. 98.

***Humaria domestica*. Mass.**

Gregarious or crowded, sessile, seated on a delicate white subiculum formed of branched, septate, hyaline hyphae, at first almost cylindrical then expanding until saucer-shaped or almost plane, slightly fleshy, about  $\frac{2}{3}$  mm. across, salmon-colour or yellowish with a pink tinge; cortex parenchymatous, cells irregularly polygonal, 8–10  $\mu$  diameter, giving origin, especially below the margin to delicate white hyphae, which fix the plant to the substratum, and run off to form the subiculum; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, elliptical, ends obtuse, 17–18  $\times$  9  $\mu$ ; paraphyses slender, septate, slightly clavate.

*Peziza domestica*, Sow., Fungi, t. 351; Phil., Brit. Disc., p. 107.

*Peziza pluvialis*, Cooke, Mycogr., fig. 90.

*Pyronema domesticum*, Sacc., Syll., viii. n. 407.

On damp plaster, also on burnt ground and damp paper.

Very close to *H. omphalodes*, differing in the somewhat larger spores, and less developed subiculum.

Sowerby's type specimen, now in Herb., Berk., Kew, examined.

\*\*\*\*\* *Disc reddish-brown or umber.*

***Humaria cervaria*. Sacc., Syll., viii. n. 566.**

Gregarious or crowded, sessile, thick in the centre, thin at the crenulate margin, glabrous, chestnut-brown; disc concave, waved; asci cylindrical, abruptly narrowed at the base; spores 8, oblong-elliptic, smooth, eguttulate, 15  $\times$  7  $\mu$ ; paraphyses linear, abundant, forked at the apices.

*Peziza cervaria*, Phil., in Stevenson's Myco. Scot., p. 308; Brit., Disc., p. 100.

On roedeer dung.

Ascophore  $\frac{1}{2}$ –2 lines broad.

This species closely resembles *P. hepatica* (Batsch), but differs in having much smaller spores, and slenderer paraphyses, not thickened at the apices, and forked.

Not examined. The above is from Brit. Disc., p. 100.

**Humaria Oocardi.** Sacc., Syll., viii. n. 571.

Scattered or gregarious, sessile, orbicular, minutely scabrid externally and pallid-brown or rufous brown, disc sometimes dingy orange-brown, plane or slightly convex, fleshy, blackish and collapsed when dry, 3–5 mm. across; hypothecium, excipulum and cortex dense, texture indistinct, somewhat gelatinous; asci stout, cylindrical, tips rounded, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, broadly elliptical, ends blunt, often 1–2-guttulate,  $18\text{--}20 \times 12 \mu$ ; paraphyses septate, tips brown, clavate, 6–8  $\mu$  thick.

*Peltidium Oocardi*, Kalchbr., in Rab., Fung. Eur., n. 521.

*Peziza Oocardi*, Cooke, Mycogr., fig. 47; Phil., Brit. Disc., p. 98.

On stones among fresh-water algae, in streams, also on rotten pine-wood.

Karsten's var. *ligniaria* only differs in growing on wet rotten wood.

Specimen from Kalchbrenner examined, also Rab., Fung. Eur., n. 521, and Karsten, Fung. Fenn., 636.

**Humaria macrospora.** Fckl., Symb. Myc., p. 323; Sacc., Syll., viii. n. 576.

Ascophore sessile, at first closed and subglobose then expanding and becoming almost plane and scutellate, fleshy, fragile, glabrous, blackish-chestnut,  $1\text{--}1\frac{1}{2}$  cm. across; excipulum parenchymatous, cortical cells  $15\text{--}20 \mu$  diameter; asci narrowly cylindrical, base narrowed into a long, slender pedicel, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, ends rather acute, distinctly warted at maturity,  $20\text{--}22 \times 10 \mu$ , paraphyses slightly thickened at the brownish tips, septate.

*Peziza macrospora*, Wallroth, Crypt. Germ., ii. p. 500 (1831–33); Cooke, Mycogr., fig. 77 (spores smooth by error).



*Peziza brunneo-atra*, Desm., Ann. Sci. Nat., ser. ii., vol. vi. p. 244 (1836); Phil., Brit. Disc., p. 76.

On the naked ground.

Fuckel, in describing the spores of *H. macrospora* does not state whether they are rough or smooth, but quotes Fung Rhen., n. 1223, in which the spores are distinctly warted. Cooke drew the figure in Mycographia, n. 77, and prepared the diagnosis of *H. macrocarpa* from Fuckel's specimens, Fung. Rhen., n. 1223, and figured and described the spores as smooth, but there is a MS. note on the figure stating that the spores were afterwards found to be warted.

Specimens in Desm., Cr. France, ser. i., n. 826, and in Fuckel's Fung. Rhen., n. 1223, examined.

***Humaria misturæ*.** Sacc., Syll., viii. n. 565.

Scattered or crowded, sessile, depresso-globose and closed at first, becoming plane or slightly convex, with an imperfectly upraised margin, rather fleshy, 1-3 mm. across, glabrous, chestnut-brown or sometimes almost brick-red; cortex parenchymatous, cells almost oblong, arranged in parallel series,  $6-7 \times 4 \mu$ ; asci rather broadly cylindrical, apex rounded, 8-spored; spores hyaline, continuous, broadly elliptical or sometimes almost globose, often 1-guttulate,  $12-14 \times 10 \mu$ , 1-seriate; paraphyses slender, septate, hyaline, irregularly branched, tips often rather closely septate, and constricted at the septa, pyriform or sometimes not enlarged.

*Peziza misturæ*, Phil., Gard. Chron., Sept. 4, 1880, with a fig.; Brit. Disc., p. 100.

First found on a mixture of lime and cow-dung spread on the trunks of apple-trees; beautiful specimens were afterwards found on the ground by Mr. H. T. Soppitt, near Bradford.

The cells forming the exterior of the cup are narrowly cylindrical and parallel; the paraphyses are remarkable from their habit of branching frequently, and from their pyriform or moniliform summits, which characters distinguish it from *P. excidiiformis*, to which it has a slight resemblance. (Phillips.)

***Humaria bovina*.** Sacc., Syll., viii. n. 580.

Ascophores gregarious, sessile, with an obconic base, expanded, umber colour, glabrous; disc umbilicate, waved;



margin paler, up to 1 cm. broad; cortical cells very large, 70  $\mu$  diameter; asci cylindrical, 8-spored; spores oblong-elliptic, smooth,  $19 \times 9 \mu$ ; paraphyses scarce or none.

*Peziza bovina*, Phil., in Stev., Myco. Scot., p. 308; Brit. Disc., p. 101.

On cow-dung. August,

Unknown to me. The above description is from Brit. Disc., p. 101.

### *Humaria viridaria*. Mass.

At first globose and closed, then hemispherical, finally almost plane, sessile,  $\frac{2}{3}$ – $1\frac{1}{2}$  cm. across, rather fleshy, greyish, pale or dark brown; excipulum parenchymatous, cells irregular, 10–16  $\mu$  diameter; externally almost smooth upwards, furnished with hyaline septate hyphae near the base, that form a delicate, cottony stratum round the base of the ascophore; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, broadly elliptical, ends obtuse, smooth, hyaline, continuous,  $11\text{--}13 \times 6\text{--}7 \mu$ ; paraphyses septate, apex clavate, 6  $\mu$  thick, brown, straight or curved.

*Peziza viridaria*, B. & Br., Ann. Nat. Hist., n. 555, ser. ii., vol. vii. p. 12; Phil., Brit. Disc., p. 82; Cooke, Mycogr., fig. 262; Sacc., Syll., viii. n. 314.

On damp walls, damp wood, &c.

Type specimen examined.

The form called *Peziza viridaria*, var. *obscurata*, Rehm, Ascom., n. 452, and characterised as follows, "darker, paraphyses clavate, septate, brown, slightly curved; spores  $11 \times 6 \mu$ . In Bavaria," is quite included in the range of variation of the typical species, in which the colour varies from very pale to dark brown. Intermediate between *Peziza* and *Humaria*.

### PEZIZA. Dill. (emended.)

Ascophore sessile, but sometimes narrowed to a short, stem-like base, fleshy and brittle, closed at first, then expanding until cup-shaped, saucer-shaped, or in some species quite plane or even convex; disc even, nodulose, or veined; externally warted, scurfy, or rarely almost glabrous; cortical

cells irregularly polygonal; asci cylindrical, 8-spored; spores obliquely 1-seriate, continuous, hyaline (rarely tinged brown), elliptical, epispore smooth or rough; paraphyses present.

*Peziza*, Dillenius, Nov. Gen. Plant., p. 76; Sacc., Syll., viii. p. 76; Phil., Brit. Disc., p. 43 (in part).

Most closely allied to *Humaria*, differing in the larger size of the ascophores, and the warted or scurfy exterior.

Growing on the ground.

\* *Epispore smooth.*

† *Disc brown or blackish-brown.*

*Peziza vesiculosa*. Bull., Champ. Fr., p. 27, t. 457, f. 1; Phil., Brit. Disc., p. 73; Cooke, Mycogr., fig. 242; Sacc., Syll., viii. n. 297.

Clustered, often distorted from mutual pressure, sessile but more or less narrowed at the base, globose and closed at first, then expanding, but the margin usually remaining more or less incurved and somewhat notched; disc pale brown, externally brownish and coarsely granular from the presence of minute, irregular warts, 3–7 cm. across; excipulum parenchymatous, cells irregularly polygonal, large, especially those forming the central zone, external cells brownish, growing out into small warts; asci cylindrical, 8-spored; spores obliquely 1-seriate, smooth, hyaline, continuous, elliptical, ends obtuse,  $21\text{--}24 \times 11\text{--}12 \mu$ ; paraphyses slender, septate, clavate.

*Helvella vesiculosa*, Bolton, t. 175.

On rich soil, manure heaps, rotten leaves, &c.

Specimen in Phil., Elv. Brit., n. 13, examined.

Usually sessile with base of ascophore narrowed, but sometimes the narrowing is so marked that a more or less elongated stem-like base is produced. Cells of excipulum large, especially at the base of the ascophore, where the median cells are so large and thin-walled that they usually deliquesce before the fungus is mature, and in consequence the hymenium becomes separated from the outermost portion of the excipulum by a slit. Substance brittle.

*Var. cerea*, Rehm, Ascom., n. 201.

Similar in size, habit, and general structure to the typical form; differing in the wax-yellow colour, the more distinct stem-like base, and the slightly smaller spores,  $18-19 \times 10 \mu$ ; very brittle.

*Peziza cerea*, Sowerby, t. 3; Cooke, Mycogr., fig. 244; Phil., Brit. Disc., p. 74; Sacc., Syll., viii. n. 272.

Sowerby's specimen examined.

On the ground among leaves, on tan-beds, &c. Spring.

*Peziza reticulata*. Grev., Scot. Crypt. Fl., pl., vol. iii. p. 156, pl. 156; Phil., Brit. Disc., p. 67; Cooke, Mycogr., fig. 227.

Ascophore almost sessile, narrowed into a very thick stem-like base which is sometimes  $1-1\frac{1}{2}$  cm. long and the same or more in thickness; fleshy, brittle, saucer-shaped and entire at first, then the margin becomes more or less lobed and wavy, drooping, and usually revolute, extreme edge sometimes crisped, 5-13 cm. across; disc reddish-tawny, usually ornamented with strongly raised ribs which anastomose to form an irregular network, outside whitish, very minutely scurfy, due to the outgrowth of irregular groups of cells from the excipulum; excipulum composed entirely of hyaline, interwoven hyphae, cortical cells inclined to become pseudoparenchymatous; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, smooth, elliptical,  $23-26 \times 12-13 \mu$ ; paraphyses rather stout, septate, clavate tips,  $7-9 \mu$  thick, brownish. Smell, very slight.

*Discina reticulata*, Sacc., Syll., viii. n. 376.

On the ground. Spring.

The present species is allied to *Peziza repanda*; its distinguishing features are the prominent nodules or anastomosing, raised lines on the disc.

I have accepted as typical, specimens collected by the late F. Currey, F.R.S., whose herbarium is now at Kew. The specimen figured by Cooke in Mycographia, fig. 227, sent from France by Professor de Seynes, agrees exactly with Currey's British specimens.

Plant solitary, 2-5 inches in diameter, of a reddish-brown within, whitish or brownish-white on the outer surface, and somewhat farinose. In the young state the cup or pileus is

roundish, depressed, the margin very connivent, and the base within umbilicate and plicate. During the period of growth, the general form becomes more depressed, and a number of lacerations are produced, of which one or more often reach to the centre. In the last stage the pileus is nearly spread out on every side, so as to rest on the ground, the extreme margin, however, still retaining its involute tendency; the centre is now much reticulated with anastomosing ribs, undulate and unequal, especially when there is a stipes, from the sides being partly deflexed. Stipes either present or nearly wanting: when present, half an inch high or more, and nearly as thick, lacunose. Substance carnose, fragile, one-tenth to one-eighth of an inch thick. Sporules 8, oval. (Greville.)

*Peziza ancilis*. Pers., Myc. Eur., p. 219; Cooke, Mycogr., fig., p. 221, fig. 371 (also fig. 239, omitting the spores); Phil., in Grev., xvii. p. 44.

Scattered, narrowed below into a short, stout, stem-like base, globose and closed at first, then cup-shaped, finally almost plane, or arched near the margin and the extreme edge slightly raised; flesh thick, brittle, 2-10 cm. across, 2-4 cm. high; disc irregularly wrinkled or nodulose, greyish-brown, often with a purple tinge, externally whitish with more or less prominent ribs spreading from the base; hypothecium and excipulum formed of stout, interwoven hyphae which become compact to form the cortex; asci cylindrical, apex slightly truncate, 8-spored; spores obliquely 1-seriate, smooth, continuous, elliptical with a prominent apiculus at each end, usually 3-guttulate,  $27-34 \times 11-13 \mu$ ; paraphyses stout, septate, clavate and brown at the apex, which is  $7-9 \mu$  thick.

*Discina ancilis*, Rehm, Krypt.-Flora, Disc., p. 979.

On damp ground.

Readily distinguished by the large ascophore, which is wrinkled and plane at maturity, and by the large elliptical, strongly-apiculate spores, which are slightly tinged brown at maturity. Iodine does not colour apex of ascus blue.

Specimens examined in Rab., Fung. Eur., n. 805, and Karst., Fung. Fenn., n. 531.

There is evidently some mistake in connection with

fig. 239 of Cooke's *Mycographia*, which is called *Peziza perlata*, Fr., and figured with elliptical spores having the ends obtuse, and said to measure  $15-20 \times 10-12 \mu$ ; this figure is stated to be drawn from specimens in Karsten's *Fung. Fenn.*, n. 531, but on examining the identical specimen that was drawn by Cooke, in the exs. quoted, I find the spores to be elliptical, 3-guttulate, and apiculate at both ends, agreeing in fact in every respect with the specimen contained in Rab., *Fung. Eur.*, n. 805, and also with fig. 371 in *Mycographia*, which appears to be the true *P. ancilis*. The species described by Saccardo—Syll., viii. n. 338—is not the fungus described here.

***Peziza linteicola*.** Phil. & Plow., *Brit. Disc.*, p. 64; Sacc., Syll., viii. n. 280.

Sessile, caespitose, very fragile, cochleate or entire, fulvous; externally farinose, hoary; margin crenate; asci cylindrical, spores 8, elliptic, eguttulate, smooth,  $12-15 \times 8-10 \mu$ ; paraphyses linear, septate, clavate at the apices.

On damp rotting linen cloth.

Ascophores  $\frac{1}{2}-\frac{3}{4}$  of an inch broad; sometimes divided to the base on one side, the edges of the division involute, at others entire, cupulate, arising from white creeping mycelium; spores vary much in size, and are shortly elliptical, approaching globose. The apices of the paraphyses are clavate or pear-shaped, with one or two large elliptic transparent nuclei (=oleaginous drops), devoid of granules. The cells forming the exterior of the cups are rather small, from  $10-20 \mu$  in diameter. (Phillips.)

Not examined.

***Peziza repanda*.** Wahlenb., *Fl. Upsal.*, p. 466; Cooke, *Mycogr.* fig. 240; Phil., *Brit. Disc.*, p. 66.

Clustered or scattered, subsessile, contracted into a short, stout, stem-like base, which is often rooting; saucer-shaped, then quite expanded and the margin more or less split and wavy, sometimes drooping and revolute, extreme edge often crenate; 4-10 cm. across; disc pale or dark brown or umber, more or less wrinkled towards the centre, externally whitish, minutely granular; excipulum pseudoparenchymatous, the component hyphae often distinct, external cells largest; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline,

smooth, continuous, elliptical, ends obtuse,  $18-22 \times 11-12 \mu$ ; paraphyses septate, clavate and brownish at the tips.

*Discina repanda*, Sacc., Syll., viii. n. 373.

Specimens communicated by Greville to Berkeley accepted as typical. These specimens are part of the gathering collected by Wauch and Greville under beech-trees at Foxhall, and figured in Scot. Crypt. Flor., pl. 59.

On the ground, often in beech-woods; also on decayed trunks.

Solitary, or several growing close together in a tufted manner, sessile, large, 1-4 inches broad, carnose, brittle, very concave while young, but gradually expanding until it becomes quite plane, sometimes splitting at the edge, but often entire, waved and somewhat lobed. Margin crenate and somewhat reflexed. Colour of the hymenium dilute-brown, of various shades; outer surface whitish, pulverulent. The base is often plicate and radicating. Pileus when splitting never convolute. (Greville.)

*Peziza isabellina*. W. G. Smith, Grev., p. 136, pl. 9; Phil., Brit. Disc., p. 63; Cke., Mycogr., fig. 241; Sacc., Syll., viii. n. 268.

Gregarious or caespitose and often distorted by mutual pressure, sessile, fleshy, margin entire, subglobose, 2.5-5 cm. across, disc smooth, brownish yellow with a shade of red (pale chestnut-brown in fig.), externally paler, subpruinose; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, elliptical, ends obtuse,  $14-8 \mu$ ; paraphyses clavate.

On decayed coniferous wood.

Allied to *P. macrocalyx* and *P. vesiculosa*, but entirely differs from both in colour, habit, and fruit. (Smith.)

Unknown to me.

*Peziza bufonia*. Pers., Myc. Eur., i. p. 225; Cooke, Mycogr. fig. 292; Phil., Brit. Disc., p. 75.

Ascophore hemispherical, usually narrowed into a short, stem-like base which is often rooting, at first closed then becoming hemispherical, fragile, margin entire or notched; disc dark but bright brown, externally the same colour or a little duller, covered with rather large warts; 2-4 cm. across; excipulum pseudoparenchymatous, cortex parenchy-



matous, cells polygonal,  $15-11\cdot\mu$  diameter, running out in irregular clusters to form the external warts; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, smooth, elliptic-oblong, ends rounded,  $20-15 \times 10-12$ ; paraphyses clavate, septate, tips brown.

*Geopyxis bufonia*, Sacc., Syll., viii. n. 252.

On damp ground, rubbish-heaps, &c.

Specimen determined by Berkeley examined.

Distinguished from *P. vesiculosa* by the dark brown disc, and more distinctly warted exterior. *P. cochleata* differs in habit and in the pruinose exterior. The present species is placed by Saccardo in *Geopyxis*, but the narrowed base never assumes the appearance of a stem, and is often obsolete.

**Peziza sepiatra.** Cooke, Grevillea, vol. iii. p. 119, fig. 135; Cke., Mycogr., fig. 261; Phil., Brit. Disc., p. 79; Sacc., Syll., viii. n. 336.

Ascophore sessile or narrowed to a very short, stem-like base, gregarious, fleshy, rather brittle, hemispherical and closed at first, soon becoming almost or quite plane, slightly marginate,  $\frac{1}{2}-1$  cm. across; disc blackish-brown, often umbilicate, externally minutely scurfy, slightly paler than the disc; excipulum parenchymatous, cortical cells large, polygonal,  $25-35\ \mu$  diameter; numerous brownish, septate hyphae  $6-8\ \mu$  thick spring from the base of the ascophore and fix it to the substratum; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, elliptical, ends obtuse,  $20-22 \times 10-11\ \mu$ ; paraphyses septate, the brownish clavate tip  $6-8\ \mu$  thick.

On the ground in damp, shady places; road-scrappings, charcoal, &c.

Type specimen examined; also specimens in Cooke, Fung. Brit., Exs., ed. ii., n. 184, and in Phillips' Elv. Brit. n. 105.

Cup  $\frac{1}{2}$  inch broad, often less, rather brittle. The margin is minutely crenulated, incurved, and paler than the disc. (Cooke.)

**Peziza cribrosa.** Grev., Flor. Edin., p. 423; Mycogr., fig. 381; Phil., Brit. Disc., p. 80; Sacc., Syll., viii. n. 317.

Solitary, sessile but narrowed into a short, stout, often lacunose or rugose, stem-like base, margin entire, hemispherical then expanding, everywhere blackish, disc darkest



and more or less covered with anastomosing veins or pits; glabrous, 1.5–2.5 cm. across; asci cylindrical, apex somewhat truncate, 8-spored; spores hyaline, smooth, continuous, broadly elliptical, ends obtuse, often 2-guttulate,  $16\text{--}18 \times 8\text{--}9 \mu$ ; obliquely 1-seriate; paraphyses slender, septate, brownish at the slightly clavate tips.

On gravelly or sandy ground among short grass.

Large,  $\frac{1}{2}$ –1 inch broad, hemispherical, at length partly spreading; but always deeply concave, wholly black, but deeper within, somewhat rugose at the base externally; margin entire. (Greville.)

Specimen from Dr. Greville in Kew Herb., examined.

*Peziza sterigmatizans*. Phil., Mycogr. p. 175, fig. 304; Phil., Brit. Disc., p. 80; Sacc., Syll., viii. n. 334.

Ascophore scattered, sessile, closed at first then expanding, irregular and wavy, margin crenulate, umber or blackish-brown, much contracted when dry, about 2 cm. across; hypothecium dense, excipulum formed of very large, irregular cells; asci elongated, cylindrical, apex rounded, 8-spored; spores irregularly 1-seriate, hyaline, smooth, continuous, elliptical, ends obtuse,  $18 \times 10\text{--}11 \mu$ ; paraphyses septate, slightly clavate, often with short lateral branchlets near the apex, or furcate.

On damp ground.

Ascophores scarcely an inch broad: paraphyses thick, septate, clavate at the tips, either furcate above, or with short lateral branches or bud-like processes. (Phil.)

Near to *P. sepiatra*, Cke., but the ascophore is rather larger, the paraphyses more or less branched, and appears in the autumn.

Specimen from Phillips examined.

*Peziza venosa*. Pers., Myc. Eur., i. p. 220; Cooke, Mycogr., fig. 228; Phil., Brit. Disc., p. 69.

Smell strong, nitrous; sessile or contracted into a short, stout, stem-like base; cup-shaped and with the margin incurved when young, then expanding and the margin becoming more or less split or lobed and wavy, 3–5 cm. across; disc umber-brown, externally whitish, minutely granular, and furnished with rather stout, anastomosing ribs

which radiate from the base; excipulum pseudoparenchymatous, cells largest at the periphery, where some run out as clavate, free tips; asci cylindrical, 8-spored; spores obliquely 1-seriate, smooth, hyaline, often with 1 large oil-globule, elliptical, ends obtuse, wall rather thick,  $18-24 \times 11-13 \mu$ ; paraphyses septate, tips clavate, brownish.

*Discina venosa*, Sacc., Syll., viii. n. 391.

On the ground. Spring.

Cup 1-2 inches broad or more, nearly as high. The strong nitrous odour of this species is very characteristic. Differs from *Acetabula vulgaris* in the short, indistinct stem and wavy ascophore.

Specimen in Cooke, Fung. Brit., n. 557, examined; also Rehm, Ascom., n. 402.

†† *Disc pale coloured.*

*Peziza ampliata*. Pers., Ic. et Descr., p. 30, t. 8, f. 3; Phil., Brit. Disc., p. 78; Cooke, Mycogr., fig. 354; Sacc., Syll., viii. n. 342.

Ascophore sessile or substipitate, fleshy, brittle, thin, at first globose and closed, soon expanding and becoming almost or quite plane, surface or margin often wavy, 2-4 cm. across when expanded; disc ochraceous, often with a cinnamon tinge, externally pallid, minutely furfuraceous or almost smooth; excipulum parenchymatous, composed of alternating zones of large and small cells; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, elliptical, ends obtuse, wall rather thick, hyaline, continuous,  $17-18 \times 9-10 \mu$ ; paraphyses septate, slightly thickened, and sometimes bent at the tips.

On rotting wood and bark of various trees. Autumn and winter.

Distinguished by the pale colour, brittle texture, becoming plane at maturity, and by the peculiar stratosed structure of the excipulum.

Specimens in Herb., Kew, determined by Cooke, examined; also specimens sent from France by M. Boudier, and figured by Cooke in Mycographia, fig. 384.

*Var. tectoria*. Mass.

Sessile or substipitate, becoming almost plane; cortical

cells irregularly polygonal; 15–25  $\mu$  diameter; remainder as in the typical form.

*Peziza tectoria*, Cooke, Grev., iii. p. 119; Mycogr., fig. 263; Phil., Brit. Disc., p. 77; and Sacc., Syll., viii. n. 325.

On damp plaster walls and on wood.

Type specimen examined.

At first appearing as a small white furfuraceous ball, seated on a white mycelium  $\frac{1}{4}$  in. across; when old becoming very irregular in form,  $1\frac{3}{4}$  in. across; margin rather thick and jagged. The tips of the asci are clear blue with iodine. (Cooke.)

I can discover no specific difference between *P. tectoria* and the specimens previously mentioned as being accepted and figured by Cooke as *P. ampliata*, neither can I indicate a varietal distinction, except in habitat. As stated by Cooke, the tip of the ascus becomes deep blue, the remainder very pale blue when treated with iodine.

*Peziza subrepanda*. Cke. & Phil., Mycographia, p. 153, fig. 260; Phil., Brit. Disc., p. 80; Sacc., Syll., viii. n. 327.

Scattered or gregarious, closed at first, soon almost plane, sessile, rather fleshy, margin minutely crenulate; disc pale buff or with a tinge of tan-colour, externally paler, delicately farinaceous, 8–12 mm. across, hypothecium and excipulum hyaline, formed of interlacing hyphae which pass into a parenchymatous cortex consisting of irregularly polygonal or almost circular cells 10–15  $\mu$  diameter, the marginal teeth are formed of smaller, slightly elongated cells; asci elongated, cylindrical, apex obtuse, 8-spored, pedicel long and stout; spores obliquely 1-seriate in the upper portion of the ascus, hyaline, smooth, continuous, broadly elliptical, ends obtuse, 17–20  $\times$  9  $\mu$ ; paraphyses hyaline, slender, septate, slightly thickened at the tips.

On the ground; on charcoal beds, &c.

Cups scarcely  $\frac{1}{2}$  an inch broad, very neat and delicate, pale fleshy tan colour, with a regular dentate margin. (Cke. & Phil.)

Type specimen examined.

*Peziza Adae*. Sadler, Trans. Bot. Soc. Edin., 1857; p. 45, with fig.; Cke., Mycogr., p. 349; Phil., Brit. Disc., p. 62; Sacc., Syll., viii. n. 283.

Sessile, somewhat caespitose or scattered, at first closed, then expanding, usually irregular, margin entire or lobed, often reflexed, flesh quite thin, 1-2.5 cm. across; excipulum composed of septate, interwoven hyphae; externally pallid, the free portion almost or quite glabrous, basal portion giving off numerous septate branched, thin-walled, colourless hyphae that fix the fungus to the matrix; disc white, or more or less deeply tinged rosy, lilac or ochraceous; asci elongated, narrowly cylindrical, base tapering, 8-spored; spores obliquely 1-seriate, hyaline, continuous, usually 2-guttulate, elliptical, ends obtuse, smooth,  $11-12 \times 7 \mu$ ; paraphyses linear, slightly clavate, hyaline.

*Peziza domiciliana*, Cke., Gard. Chron., 1877.

On damp, plastered walls, &c.

Authentic specimens from the author examined.

Distinguished among the large species of *Peziza* by the very thin, delicate ascophore, also the small spores.

*Peziza mellea*. Cke. & Plow., Grev., v. p. 119; Cke., Mycogr., fig. 383; Phil., Brit. Disc., p. 78; Sacc., Syll., viii. n. 321.

Solitary, sessile, hemispherical and closed at first, becoming plane but the margin slightly raised and incurved, rather thin, disc honey-colour, externally darker, glabrous, 1-1½ cm. across; cortex parenchymatous, cells irregularly polygonal, 15-25  $\mu$  diameter; asci cylindrical, slightly narrowed and truncate at the apex, 8-spored; spores smooth, hyaline, continuous, elliptical, ends obtuse,  $17-18 \times 9 \mu$ , obliquely 1-seriate; paraphyses slender, septate, hyaline, tips slightly clavate.

On decaying ash.

Type specimen examined.

Resembling a small specimen of *P. ampliata*; differing in the smaller size of the ascophore, externally glabrous, and slightly in colour. The tip of the ascus becomes deep blue, the remainder very pale blue with iodine.

*Peziza ochracea*. Boudier, MS.; Cooke, Mycogr., p. 225, fig. 377; Phil., Brit. Disc., p. 62; Sacc., Syll., n. 278.

Usually densely clustered; 2-5 cm. across, sessile, closed at first then expanding, often irregular from lateral pressure,

margin generally remaining more or less incurved, often irregular; brittle, flesh thick at the base, becoming thin at the margin; excipulum composed of interwoven, branched, septate hyphae, mixed with concatenate vesicular cells; the latter project in irregular clusters and give the outside a scurfy appearance; disc often wrinkled, bright ochraceous, externally paler; asci cylindrical, dehiscing by an apical, circular lid, 8-spored; spores elliptical, ends obtuse, smooth, hyaline, continuous, 1-2-guttulate,  $21-25 \times 10-12 \mu$ ; paraphyses slender, septate, apex slightly thickened, and frequently with an indication of branching, hyaline.

On the ground, frequently under beech-trees.

Authentic specimen from Boudier examined.

**Peziza perlata.** Fries, Syst. Myc., ii. p. 43; Karst., Myc. Fenn., p. 39; Cooke, Mycogr., fig. 239.

Cups large, shortly stipitate, at first subglobose, then expanded, undulate, splitting at the margin; externally white, even; hymenium wrinkled, pale cinnamon; stem stout, lacunose, white, flesh thick; asci cylindraneo-clavate, attenuated below the spores, truncate at the summit; spores 8, elliptic, pale brown, smooth,  $15-20 \times 10-12 \mu$ ; paraphyses numerous, rather stout, septate, guttulate, broadly clavate at the summit, brown.

*Discina perlata*, Fries, Sverige Svamper, t. 56.

Karst., Fung. Fenn., n. 531.

On burnt charcoal beds.

Cups  $2\frac{1}{2}$  in. broad before expanding,  $3\frac{1}{2}$  in., or even more when expanded. Stem  $\frac{1}{2}$  in. long,  $\frac{3}{4}$  in. broad; flesh at base of cup  $\frac{1}{2}$  in. thick, near the margin 1 line thick. The spores are pale brown, and homogeneous within. Karsten found the spores in his specimens elliptic or fuso-elliptic, and 1-3-guttulate, neither of which characters were present in my specimens. Still I have no doubt they are correctly referable to this species.

The above is entirely from Phillips, who first recorded the species as British, in Grevillea, vol. xviii., p. 82. As to whether it is the species of Fries, I am unable to say, but the description does not at all accord with the figure given by Fries in Sveriges Svamper, t. 56, although this is quoted by Phillips. It is remarkable that Phillips quotes Karsten's

description and exsicc., when he admits that the spores are so very different. Karsten's specimens, as I have explained under *Peziza ancilis*, are typical of the last-named species.

**\*\* *Epispore* rough.**

***Peziza badia*.** Pers., Obs., ii. p. 78; Cke., Mycogr., fig. 226; Phil., Brit. Disc., p. 58; Sacc., Syll., viii. n. 293.

Gregarious or caespitose, sessile or narrowed into a very short, stout, stem-like base and often more or less lacunose; subglobose and closed at first, then cup-shaped or more expanded, margin entire or nearly so, the entire cup often wavy, rather thick, 3-5 cm. across; disc dark brown, externally paler brown and minutely granular, often with a purple tinge; hypothecium and excipulum formed of stout, septate, irregularly inflated hyphae, hypothecium compact, excipulum spongy and cavernous; cortex compact, the hyphae running out in irregular lumps to form the external granulations; asci cylindrical, apex truncate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, with one large oil-globule, minutely warted at maturity,  $15-19 \times 9-10 \mu$ ; paraphyses septate, tips slightly clavate.

On the ground among grass, &c., also on scorched places.

Readily distinguished by the bay or umber-brown disc, and the minutely warted spores.

Specimen examined in Phil., Elv. Brit., n. 9.

*Peziza atro-vinosa*, Ger. & Cooke, is a North American species, and not British as stated by Saccardo—Syll., viii. p. 83; it is allied to *P. badia*, but differs in the coarsely nodulose, elliptic-oblong spores.

***Peziza saniosa*.** Schrader, Journ. Bot., vol. ii. p. 64 (1799); Phil., Brit. Disc., p. 70; Cooke, Mycogr., fig. 299 (spores smooth).

Ascophore sessile, flesh thick especially at the base, cup-shaped and slightly contracted at the base, regular, margin entire, up to 1 cm. across; disc varying from purplish-brown to dark violet, externally minutely scurfy, brown with a purple tinge; excipulum entirely composed of thick interwoven hyphae; asci cylindrical, 8-spored; spores



elliptical, hyaline, 1-2-guttulate, minutely warted,  $17-18 \times 8-9 \mu$ , 1-seriate; paraphyses stout, septate, slightly and gradually clavate; a quantity of violet liquid exudes when the fresh plant is wounded.

*Galactinia saniosa*, Sacc., Syll., viii. n. 396.

On the ground and on old trunks in damp, shady places.

Specimen determined by Berkeley accepted as typical, which certainly has verruculose spores. Phillips says the spores are smooth, and he quotes the figure by Patouillard, Icon. Analyt., fig. 375, where the spores are drawn distinctly warted. The specimens from Apethorpe, and near Bristol, are in the Kew Herbarium, and both have warted spores.

Phillips figures what he supposed to be *Peziza saniosa*, Schrader, in "Grevillea," ii. pl. 24, fig. 3, and there the spores are drawn smooth; in Brit. Disc. the spores are said to be smooth, and to measure  $15 \times 7.5 \mu$ ; finally, the figure by Cooke in Mycographia, fig. 299, "figured from drawings and specimens communicated by Mr. W. Phillips," has smooth spores. The specimens said to have been communicated by Phillips, I cannot find in Cooke's Herbarium. As the matter stands at present, we may consider that Schrader's *Peziza saniosa* has minutely warted spores; specimens showing this character have been examined from Britain, France, and Germany. The specimens examined by Phillips have possibly been immature, and hence the spores would be smooth; or belong to a distinct species differing from *P. saniosa* in the permanently smooth spores.

***Peziza lividula*.** Phil., in Cooke's Mycogr., p. 161, fig. 277; Brit. Disc., p. 76, pl. iv. fig. 18; Sacc., Syll., viii. n. 339.

Ascophore obconic and closed at first, then expanding and somewhat wavy, margin entire, attached by a narrowed base; 1-2 cm. across; externally almost glabrous; entirely smoky lead-colour, often with a purple shade, fleshy; excipulum entirely parenchymatous, cells irregularly polygonal, largest at the periphery; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, continuous, often 1-2-guttulate, elliptical, ends obtuse, at first smooth, finally very minutely verruculose,  $18-20 \times 10 \mu$ ; paraphyses septate, tips clavate or almost capitate sometimes.



On the ground in damp places.

Authentic specimen from Phillips examined.

*Peziza succosa*. Berk., Ann. Nat. Hist., n. 156, vol. vi. p. 358, t. x., fig. 5 (1841); Cooke, Mycogr., fig. 243; Phil., Brit. Disc., p. 70.

Usually solitary, sessile, hemispherical with the margin incurved at first, then cup-shaped,  $1\frac{1}{2}$ – $2\frac{1}{2}$  cm. across; disc pale yellowish-brown, externally paler and minutely scurfy; excipulum composed of stout, somewhat nodulose, interwoven hyphae. asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, verruculose,  $19$ – $21 \times 11$ – $12 \mu$ ; paraphyses septate, becoming gradually clavate towards the tip; a yellow liquid exudes when broken.

*Galactinia succosa*, Sacc., Syll., viii. n. 397.

Type specimen examined.

On the ground in woods.

Cup 1 inch in diameter, hemispherical or subglobose, with the margin incurved; within of a pale waxy brown, without paler and mealy. The flesh when broken pours out a yellow juice. (Berk.)

Cup 1 inch broad, subglobose, then hemispherical, sometimes cochleate, but generally entire, when moist transparent, pale brown; exterior mealy or pruinose, dirty white; the juice is limpid and nearly colourless when it issues from the wound, but soon changes to yellow. (Phil.)

*Peziza pustulata*. Pers., Syn., p. 646; Phil., Brit. Disc., p. 72; Cke., Mycogr., fig. 298; Sacc., Syll., n. 303.

Scattered or gregarious, sessile, globose at first, then hemispherical, expanded at length, but the margin usually remaining more or less incurved, and often plicate, entire or slightly irregular, 2–4 cm. across, fleshy; disc pallid or dull brown; externally dull brown below, becoming whitish and scurfy towards the margin; excipulum parenchymatous, cells almost uniform in size,  $12$ – $16 \mu$  diameter; asci cylindrical, apex somewhat truncate, deep blue with iodine, 8-spored; spores obliquely 1-seriate, elliptical, hyaline, continuous, verruculose, often guttulate,  $19$ – $21 \times 9$ – $10.5 \mu$ ; paraphyses septate, clavate, apex usually brown.

On the ground, charcoal beds, &c.

Specimen in Phillips, *Elv. Brit.*, n. 14, examined.

Cup  $\frac{1}{2}$  an inch to  $1\frac{1}{2}$  inch broad. The flesh is thick and rather firm; the exterior of the cup coarsely furfuraceous, dark sooty-brown, but pale towards the subcrenate margin. It is gregarious, and sometimes caespitose. The apices of the paraphyses are filled with brown granules. (Phillips.)

*Peziza indiscreta*. Phil. & Plow., *Grev.*, vol. viii. p. 99; *Brit. Disc.*, p. 73; *Sacc., Syll.*, viii. n. 305.

Scattered or crowded, sessile, hemispherical, fleshy; disc concave, blackish-brown, externally somewhat verrucose, umber-brown, 10–16 mm. diameter; asci cylindrical, 8-spored; spores elliptical, 1–2-guttulate, asperate,  $16\text{--}18 \times 9\text{--}10 \mu$ ; paraphyses linear, septate, slightly thickened at the apices.

On the earth under lime-trees.

Unknown to me.

*Excluded species.*

*Peziza argillacea*. Sow., *Eng. Fung.*, t. 148; Phil., *Brit. Disc.*, p. 109.

No specimen exists, and Sowerby's figure is not sufficient for the correct determination of the species.

OTIDEA. Pers. (emended.)

Ascophore shortly stipitate or sessile, large, fleshy or somewhat leathery, externally scurfy, villose, or almost glabrous; elongated and cut down one side nearly or quite to the base—hare's-ear shaped—or irregularly contorted and often caespitose; asci cylindrical, apex rounded or slightly truncate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, smooth or rough, elliptical; paraphyses septate.

*Otidea*, Pers., *Myc. Eur.*, i. p. 220 (as a subgenus of *Peziza*); *Sacc., Syll.*, viii. p. 94.

The present genus as defined above is characterised by the very irregular ascophore; in some species it is erect and ear-shaped, being cut down one side, and corresponding with the genus *Otidea* as interpreted by some authors. In other species the ascophore is only slightly oblique and

incised on one side; others again are very much contorted, vertically involute, and often clustered, forming the genus *Cochlearia* of some authors.

Growing on the ground.

\* *Disc brown, ochraceous or buff.*

**Otidea leporina.** Fuckel, Symb. Mycol., p. 329; Sacc., Syll., viii. n. 349.

Gregarious or often caespitose, ear-shaped or obliquely cup-shaped, margin usually involute, divided to the base on one side, narrowed below into a short stem-like base, 2-7 cm. high and broad; externally pale ochraceous, or sometimes like the even or rarely wrinkled disc subferruginous; excipulum composed of densely interwoven, hyaline hyphae, which run out at the surface into clavate, septate tips of a pale brown colour, arranged in a parallel series; some of the clavate threads give origin to one or two short chains of moniliform cells, and these give to the exterior a pulverulent appearance; asci cylindrical, 8-spored; spores obliquely uniseriate, hyaline, smooth, continuous, 1-2-guttulate, elliptical,  $12-15 \times 7-8 \mu$ ; paraphyses filiform, septate, apex slightly swollen, and usually strongly curved.

*Peziza leporina*, Batsch, Elench., p. 117; Cooke, Mycogr., fig. 211.

On the ground in woods, among leaves, &c.

Specimens examined from Phillips, Elv. Brit., n. 11; and Rehm's Ascom., n. 653.

Cup 1-3 inches high, 1-3 inches broad, gregarious, often caespitose; margin involute, divided to the base on one side; disc even or rarely wrinkled, a shade darker than the exterior; paraphyses slender, hardly thickened at the summits, but almost invariably crooked. This fine species grows as large as *O. onotica* at times, but is not so brightly coloured, being throughout of a sober tan-colour, resembling common wash-leather used for cleaning plate. (Phillips.)

**Otidea neglecta.** Mass., Grev., vol. xxii. p. 66.

Gregarious, coriaceous and tough, constantly hare's-ear shaped, narrowed downwards into a short, usually grooved whitish stem-like base; margins at first involute and

approximate, then expanding and becoming sometimes almost plane, rigid when dry,  $4-7 \times 3-5$  cm.; disc deep tawny-ochraceous or bay-brown; externally whitish, with a tinge of yellow or ochraceous; excipulum composed of hyaline, sparsely septate, and densely interwoven hyphae ( $4-6 \mu$  thick), which run out to the circumference as parallel, closely packed, septate, obtuse, sub-clavate hyphae,  $10-14 \mu$  diameter; asci cylindrical, narrowed at the base into a flexuous pedicel; 8-spored; spores obliquely 1-seriate, smooth, hyaline, continuous, usually 1-guttulate, elliptical, ends obtuse,  $18-24 \times 12-14 \mu$ ; paraphyses straight, septate, apex clavate, brownish,  $6-8 \mu$  diameter.

*Otidea auricula*, Rehm, Hedwigia, 1883, n. 3, p. 34; Sacc., Syll., n. 351. (non Cooke.)

*Peziza (Otidea) auricula*, Bresadola, Fungi Tridentini, p. 67, t. lxxiii. (Cooke.)

Specimens examined in Rehm. Ascom., nos. 652 and 652 B; Rabh., Fung. Eur., n. 512.

On the ground.

On account of the peculiar structure of the excipulum, and the somewhat cartilaginous consistency of the species here called *Otidea neglecta*, Boudier has made this species the type of a new genus, *Wynnella*, but for the following reasons I do not think it advisable to adopt this idea. In the British species of *Otidea*, Pers., the leading feature of which is the oblique, more or less hare's-ear shaped ascomphore, we find that the following species have the excipulum composed of densely interwoven, hyaline hyphae which become abruptly converted, close to the outside, into a more or less coloured cortex, consisting of somewhat parallel, septate hyphae. which sometimes adhere laterally, and form an approach to a parenchymatous tissue; the external cells are arranged in irregular groups, thus producing the scurfy or pulverulent outer surface; *Otidea neglecta*, *O. leporina*, *O. apophysata*, *O. phlebophora*, *O. pleurota*. A second type of structure is illustrated by *O. auricula* and *O. micropus*, and consists of the excipulum being entirely parenchymatous, the cells very large and irregularly polygonal; cortex as in the previous type. Finally, *O. onotica* exhibits a type of structure exactly intermediate between the two previously described; the hypothecium and the broad cortical layer

are truly parenchymatous, whilst a central zone consists of densely interwoven, hyaline hyphae.

*Otidea auricula*. Mass. (non Bresad.), Grev., vol. xxii. p. 65.

Somewhat caespitose or solitary, rather fleshy, elongated on one side, the short side cut down, narrowed below into a more or less distinct stem-like base, the two margins involute and approximate when young, then expanding into the form of a hare's ear, or sometimes shorter and blunter; coriaceous when fresh, becoming rigid when dry, 3-6 cm. high, and 3-4 cm. across; disc yellowish-brown, with a flesh-coloured tinge, externally similar or a shade paler; excipulum parenchymatous, cells very large, mostly elongato-hexagonal,  $35-50 \times 25-30 \mu$ , becoming suddenly small, but yet parenchymatous towards the surface; asci cylindrical, base narrowed into a slender, usually flexuous pedicel, apex truncate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, smooth, eguttulate,  $25-30 \times 12-14 \mu$ ; paraphyses scanty, equal in length to the asci, slender, septate, the upper third gradually expanding into a clavate tip  $5-6 \mu$  broad, hyaline.

*Elvela auricula*, Schaeffer, Icon., t. 156.

*Peziza (Cochleata) auricula*, Cooke, Mycogr., p. 124, fig. 213; Phil., Brit. Disc., p. 54.

Specimen examined from Cooke, Fung. Brit., Exs., n. 473.

On the ground.

We consider the fungus figured by Cooke, in Mycogr., fig. 213, called *Peziza (Cochleata) auricula*, to be identical with the plant in Schaeffer's Icon., t. 156, called *Elvela auricula*, notwithstanding the remarks of Bresadola and Rehm to the contrary. Schaeffer's description commences with "Est fungus unicolor," which is true of Cooke's fungus, whereas the fungus upheld by Bresadola and figured in Fungi Tridentini, t. lxxiii., is described as being externally "Ex albido-luteola, marginibus ochraceis, disco laete fulvo-ochraceo, demumque badio-fulvo." Rehm has the same species in view as Bresadola, and in the comments of his Ascom., Fasc. xiv., in "Hedwegia," 1883, p. 34, has "652, *Otidea auricula* (Cooke sub *Peziza*); compare Cooke, Mycogr., pl. 54, f. 213 (Farbe der Perithezien

etwas zu hellbraun"). Rehm evidently considers that his fungus is the same as Cooke's, but that the latter differs in being the same colour all over. A few lines further on Rehm, in giving the synonymy of his supposed *Otidea auricula*, says, "Minime, Cooke, F. Brit., i. 473 (Jod intensive †)," hence we see that Rehm accepts Cooke's figure of *Otidea auricula*, but rejects the specimens from which the figure was drawn. If either Bresadola or Rehm had made a comparative examination of the tissue of Cooke's fungus with their own they would have found out at once that they were dealing with two distinct species. Finally, *Otidea auricula*, as understood by Cooke and described above, is characterised by being everywhere yellowish-brown; excipulum parenchymatous, cells very large; paraphyses clavate, straight, equal in length to the asci. Among near allies *O. onotica* differs in the smaller spores, *O. leporina* in the paraphyses being curved at the tips; and the somewhat distantly allied fungus, confused by Bresadola and Rehm with the true *O. auricula*—which may be called *Otidea neglecta*—is sharply distinguished by the bay-brown disc, and the excipulum consisting of densely interwoven septate hyphae that become arranged in a parallel series towards the outside.

**Otidea pleurota.** Phil., Brit. Disc., p. 51, pl. 3, fig. 13; Sacc., Syll., viii. n. 363.

Sessile, but attached by a narrowed base, slightly elongate on side, divided nearly to the base on the shorter sides, 2–3 cm. across, rather fleshy, excipulum composed of intricately interwoven hyphae, 6–8  $\mu$  thick, running out into a superficial layer of irregularly globose cells, 18–24  $\mu$  diameter, hypothecium cavernous; disc umber-brown, externally smooth and paler in colour; asci elongated, narrowly-cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, continuous, densely and minutely warted, usually 1-guttulate, 15  $\times$  8–9  $\mu$ ; paraphyses stout, becoming gradually clavate upwards; apex 5–7  $\mu$ , thick, brown, septate.

*Peziza pleurota*, Cke., Micogr., fig. 351.

Authentic specimens from Phillips examined.

On cow-dung.

Readily recognised if attention be paid to the exceptional



habitat, warted spores, and the dark brown disc, which often shows a tinge of purple.

**Otidea apophysata.** Cke. & Phil., Brit. Disc., p. 54; Sacc., Syll., viii. n. 354.

Sessile, caespitose or gregarious, irregular in form, margin variously cut, erect, elongated on one side, rather thin,  $1\frac{1}{2}$ – $2\frac{1}{2}$  cm. across; excipulum formed of hyaline, densely interwoven hyphae about  $6\ \mu$  thick, these run out at the surface into more or less parallel septate hyphae forming cells about  $10$ – $12\ \mu$  diameter, of a brown colour, and terminating in irregular groups, giving a scurfy appearance to the dark brown exterior of the ascophore; disc smooth, blackish-brown; asci cylindrical, 8-spored, apex somewhat truncate; spores obliquely 1-seriate, elongated, elliptical, continuous, hyaline, smooth, usually 2-guttulate,  $21$ – $24 \times 10\ \mu$ ; paraphyses slender, septate; apex very slightly thickened, straight or slightly curved, sometimes with short irregular branches.

*Peziza apophysata*, Cke. & Phil., Grev., vol. v. p. 60; Cooke, Mycogr., fig. 350.

On the side of a wet ditch.

Type specimen examined.

**Otidea micropus.** Sacc., Syll., viii. n. 366.

Ascophore shortly stipitate, very oblique, cat's-ear shaped, often wavy, rather thin, dingy white, pale buff, or greyish, sometimes obliquely cup- or funnel-shaped, 2–3 cm. high and broad; excipulum composed of very large polygonal cells; these become much smaller towards the outside, are slightly tinged brown, and grow out in irregular clusters, making the outside coarsely scurfy; stem, 3–5 mm. long and thick; sometimes absent; asci cylindrical, apex rather truncate, 8-spored; paraphyses slender, straight, septate, apex clavate and  $5$ – $6\ \mu$  thick; spores obliquely uniseriate, elliptical, continuous, smooth, protoplasm coarsely granular,  $15$ – $16 \times 8$ – $9\ \mu$ .

*Peziza micropus*, Pers., Syn., p. 642; Pers., Icon. et Descr., t. 8, fig. 3; Phil., Brit. Disc., p. 63; Cooke, Micogr., p. 1300.

On old damp wood, rotting carpet, &c.

Differs from *O. leporina* in the straight paraphyses, and from *O. onotica* in the pale colour and larger spores.



*Otidea plebophora*. Phil., Brit. Disc., p. 55; Sacc., Syll., n. 362.

Usually growing singly, narrowed to a very short stem-like base, becoming rather widely expanded and shallowly cup-shaped, usually somewhat oblique, 2-3 cm. across, entirely of a yellowish-brown colour; excipulum composed of intricately interwoven, hyaline hyphae, 4-6  $\mu$  thick, running out at the surface into an irregular layer of pale brown cells, 8-12  $\mu$  diameter; externally ornamented with branched ribs, which start from the base and often end in little pits; disc often venose; asci narrowly cylindrical, 8-spored; spores obliquely uniseriate, elliptic-oblong, smooth, continuous, hyaline, often 2-guttulate, 10-12  $\times$  5-6  $\mu$ ; paraphyses rather stout, septate, apex clavate, 5-6  $\mu$  thick, straight or slightly bent.

*Peziza phlebophora*, B. & Br., Ann. Nat. Hist., n. 1153, ser. iii., vol. xviii., p. 8, pl. 3, figs. 9-11 (1866); Cooke, Mycogr., fig. 217.

On dry banks.

Type specimen examined.

*Otidea cochleata*. Fckl., Symb., p. 329.

Sessile, caespitose, variously contorted and plicate, fleshy, brittle, disc umber brown, externally paler and pruinose, sometimes altogether paler and leather-colour or pale dingy ochraceous, 5-8 cm. diameter; when solitary or almost so, at first globose, then expanding with the margin involute, finally spreading and irregularly plicate; excipulum spongy and cavernous, due to the loose web formed by interlacing, hyaline, thin-walled, flaccid, septate hyphae, cortex compact, running out into irregular groups of cells that form the scurfy exterior; asci cylindrical, apex slightly truncate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, smooth, usually 2-guttulate, 16-18  $\times$  7-8  $\mu$ ; paraphyses slender, septate; tip slightly clavate, often curved, and sometimes branched.

*Peziza cochleata*, Bulliard, Champ. Fr., t. 154, fig. 2; Phil., Brit. Disc., p. 60; Cooke, Mycogr., fig. 212; Sacc., Syll., viii. n. 307.

*Peziza umbrina*, Pers., Obs., i. p. 77.

On the ground.

Specimen named by Fries examined ; also a specimen determined by Berkeley.

Closely resembling *O. leporina* in the curved paraphyses, but distinguished by the ascophore being irregularly plicate and not distinctly and evenly ear-shaped, and more especially by the spongy structure of the excipulum, the interwoven hyphae leaving large, more or less polygonal spaces which might at first be mistaken for the cells of a parenchymatous tissue. The entire substance is brittle and rather watery, and usually assumes a yellowish tint when bruised. Smell and taste almost none.

Sometimes the ascophores are closely crowded, hence irregular and much contorted, and resembling a foliaceous *Tremella* or a small specimen of *Sparassis crispa*. Such conditions are figured by Nees, Syst., fig. 280, and by Berkeley in Gard. Chron., fig. 77.

#### **Otidea alutacea. Mass.**

Ascophore sessile but contracted at the base, usually clustered, variously contorted, disc tan-colour or smoky, externally paler or whitish, almost smooth except the base, which is covered with very short, white down, 3-6 cm. across; excipulum densely parenchymatous; asci narrowly cylindrical, 8-spored; spores elliptic-oblong, ends obtuse, continuous, 2-guttulate, smooth at first, then minutely verruculose and with a faint tinge of brown,  $14-16 \times 6-7 \mu$ , 1-seriate; paraphyses slender, apex clavate, brownish.

*Peziza alutacea*, Pers., Syn., p. 638; Phil., Brit. Disc., p. 61; Sacc., Syll., viii. n. 273.

*Plicaria alutacea*, Fckl., Symb. Myc., p. 327.

On the ground in woods.

Specimen in Fuckel's Fung. Rhen., n. 1229, examined.

Allied to *P. cochleata*, but distinguished by the almost glabrous exterior of the ascophore, and more especially by the verruculose, smaller spores.

Persoon says that the exterior varies to tan-colour, and the disc to smoky with a purple tinge.

#### **Otidea grandis. Mass.**

Caespitose or solitary, sessile, usually wavy and more or less plicate, margin entire, rarely divided to the base on one side, but never ear-shaped, 5-7 cm. across, 3-4 cm. high;

disc ochraceous-yellow or tinged brown; externally dark olive-green or olive-brown, lacunose and covered with white down at the base, attached to the ground by rusty mycelium; excipulum formed of compactly interwoven, hyaline hyphae, which becomes more or less parenchymatous at the surface, forming a coloured, slightly scurfy cortex; asci cylindrical, wavy and narrowed at the base, 8-spored; spores obliquely uniseriate, smooth, hyaline, continuous, usually 2-guttulate, elliptical, ends narrowed,  $16-18 \times 7-8 \mu$ ; paraphyses slender, septate, slightly thickened and often curved at the apex, hyaline.

*Peziza grandis*, Pers., Obs., i. p. 27; Cooke, Mycogr., fig. 376; Sacc., Syll., viii. n. 275; Phil., Brit. Disc., p. 61.

On the ground in pine woods, &c.

Specimen in Rehm's Ascom., n. 651, accepted as typical; Rehm, Ascom., n. 651b, also called *Otidea grandis*, is *Peziza cochleata* as understood in the present work.

The asci, spores, and paraphyses are practically alike in *Peziza cochleata*, *Otidea leporina*, and *Peziza grandis*. The first is distinct in the very open, spongy web of hyphae forming the subiculum; the two last named agree in the very densely interwoven hyphae of the excipulum, but *O. leporina* is pale tan externally, whereas *P. grandis* is dark olive-green.

**\*\* *Disc orange.***

***Otidea onotica.*** Fckl., Symb. Myc., p. 329; Sacc., Syll., viii. n. 350.

Very variable in form, usually elongated on one side and ear-shaped, but sometimes almost equal-sided and entire, 3-7 cm. high, up to 5 cm. wide, becoming narrowed to a more or less wrinkled, short stem-like base; disc pale orange, usually with a rosy tinge, externally pale tawny-orange; excipulum parenchymatous also the hypothecium, middle layer formed of interwoven, septate, hyaline hyphae, 6-9  $\mu$  thick, becoming again parenchymatous and pale brown towards the outside, the cells growing out in irregular clusters and forming the mealy exterior; asci elongated, narrowly cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, smooth, colourless, ends obtuse, 1-2-guttulate,  $14-15 \times 8-9 \mu$ ; paraphyses straight, septate, apex clavate.

*Peziza onotica*, Pers., Sym. Fung., p. 637; Phil., Brit. Disc., p. 52; Cooke, Mycogr., fig. 210.

On the ground in woods, among leaves, &c.

Specimens examined from Sydow, Myc. March., n. 160; Cooke, Fung. Exs., ed. ii. n. 365; and Fuckel, Fung. Rhén., n. 1232.

Differs from *O. leporina* in the brighter colour of the ascophore, and the straight paraphyses.

***Otidea aurantia*. Mass.**

Sessile or protracted into a very short stem-like base, caespitose and irregular, or growing singly and then circular in outline and regular, becoming almost plane; thin, brittle, disc clear, deep orange or sometimes orange-red, externally much paler, or sometimes almost white, with a pink tinge, delicately tomentose, due to the presence of short, stout, blunt, 1-2-septate hyaline hairs; varying from 1-8 cm. broad; hypothecium formed of stout, hyaline, aseptate, interwoven hyphae, passing into an imperfectly parenchymatous cortex formed of subglobose cells 10-14  $\mu$  diameter, these cells in turn give origin to the external hairs; asci cylindrical, apex obtuse, pedicel slender, 8-spored; spores obliquely 1-seriate, broadly elliptical, hyaline, continuous, at first smooth and 2-guttulate, then becoming ornamented with very delicate ridges combined to form an irregular network, 15-16  $\times$  7-8  $\mu$ ; paraphyses slender, ending in a clavate or pear-shaped head 7-9  $\mu$  broad, filled throughout their length with orange granules when fresh.

*Peziza aurantia*, Pers., Obs., ii. p. 76; Phil., Brit. Disc., p. 56; Sacc., Syll., viii. n. 253; Cooke, Mycog., fig. 203.

On the ground, often near stumps or among chips.

Sometimes crowded, large, with the margin raised and very much waved and more or less incised, at others scattered, smaller, almost or quite even and finally spread flat on the ground. Easily recognised by the large size, bright orange disc, pale, downy exterior, and the broadly elliptical spores covered with a delicate network of raised lines at maturity.

Specimens examined from Phil., Elv. Brit., n. 12, and Fuckel's Fung. Rhén., n. 1228.

*Var. stipitata*, Phil., Brit. Disc., p. 57.

Disc bright scarlet; stem equalling the height of the cup, 4 mm.

Not examined.

*Var. atromarginata*, Phil. & Plow., Gard. Chron., Feb. 11, 1882, with fig.; Phil., Brit. Disc., p. 57.

Ascophore 1-2.5 cm. across, disc blood-red, wrinkled: margin black, owing to the presence of minute, septate, bristle-like hairs; the tuberculate spores are frequently furnished with thread-like appendages at the extremities, pointing in opposite directions obliquely to the long axis of the spores.

Not examined.

The "septate, bristle-like hairs" at the margin appear to separate this variety from the neighbourhood of *P. aurantia*.

### *Otidea fibrillosa*. Mass.

Ascophore sessile or with a very short stem-like base, 2-3 cm. broad, when young the margin is involute, afterwards erect, often divided on one side, rather fleshy; disc orange; excipulum composed of large cells, the external ones of which give origin to thick, wavy, interwoven, colourless, septate hyphae, 5-6  $\mu$  thick, which form a dense whitish tomentum outside, quite up to the margin; asci cylindrical, attenuated at the base, spores 8, uniseriate, arranged obliquely or straight, hyaline, smooth, elliptical, ends obtuse, eguttulate, 15-17  $\times$  9  $\mu$ ; paraphyses cylindrical 2  $\mu$  thick, ending in a globose, orange-coloured head, 4-5  $\mu$  diameter.

*Peziza fibrillosa*, Currey, Linn. Trans., vol. xxiv. p. 153; Phil., Brit. Disc., p. 66; Sacc., Syll., viii. n. 259.

On the ground. Autumn.

Somewhat resembling *P. aurantia*, but known from this and allied species by the globose heads of the paraphyses, apparently constantly smooth, eguttulate spores, and tomentose exterior of ascophore.

### *Otidea luteo-nitens*. Mass.

Ascophore  $\frac{1}{2}$ -1 $\frac{1}{2}$  cm. broad, globose when very young, then concave, at length more or less plane, wavy, and irregular; disc bright orange-yellow, externally rather paler, glabrous for a short distance from the margin, then the large cells of

the excipulum give off numerous colourless, septate hyphae, 5-6  $\mu$  thick, which fix the fungus to the ground; asci cylindrical, base narrowed and often slightly curved, spores 8; obliquely uniseriate, elliptic-oblong, ends obtuse, hyaline, often 1-2-guttulate, smooth at first, then becoming distinctly asperate, 12-13  $\times$  6-7  $\mu$ ; paraphyses cylindrical, 1.5  $\mu$  thick, becoming slightly clavate and yellowish at the apex.

*Peziza luteo-nitens*, B. & Br., Ann. Nat. Hist. (n. 556), ser. ii., vol. vii. p. 13; Phil., Brit. Disc., p. 58; Sacc., Syll., n. 254.

*Aleuria luteo-nitens* (B. & Br.), Gillet, Champ. Fr., Disc., icon.

On the bare ground.

Gregarious or sometimes crowded; the disc is sometimes of a deep primrose yellow colour. Distinguished from *P. aurantia* by its smaller size, but probably nothing more than a small form of the last-named species. This affinity was observed by Berkeley and Broome, who say in a note following the diagnosis, "resembling at first sight stunted specimens of *Pez. aurantia*, but essentially different, not only as proved by the habit, but the smooth, not echinulate or pointed spores." The spores are certainly rough when perfectly mature, as first observed by Phillips, so that now there remains but little more than the smaller size of the ascophore and the spores. Type specimen examined.

### **Otidea leuculenta.** Mass.

Ascophore 1-3 cm. across, sessile, fleshy, subglobose then expanded and concave, often wavy; disc bright orange-yellow, externally paler in colour and downy, the down becoming more abundant away from the margin, and fixing the fungus to the soil, excipulum parenchymatous, cells large; asci cylindrical, slightly narrowed at the base, spores 8, obliquely uniseriate, elliptic-oblong, hyaline, for a long time perfectly smooth and 2-guttulate, finally the epispore becomes ornamented with delicate raised lines anastomosing to form a polygonal network, 23-25  $\times$  10-11  $\mu$ ; paraphyses cylindrical below, the upper half very slightly and gradually expanding to form a clavate apex which is filled with orange granules, sometimes sparsely septate.

*Peziza leuculenta*, Cooke, Mycogr., p. 121, fig. 208; Phil., Brit. Disc., p. 59; Sacc., Syll., 261.



*Leucoloma leuculentum* (Cooke), Rehm, Ascom., n. 351.

On the ground under trees, &c.

Solitary or scattered. The spores are described as smooth by Cooke, and also by Phillips, and this is usually the case, and with two large oil-drops, but a careful examination of the type specimen showed the spores in some of the asci are as described above. The apores in many species of *Peziza* are very treacherous in this respect; remaining perfectly smooth, whereas now and again a few asci occur in which the spores have the epispore distinctly ornamented.

*P. fibrillosa*, Curr., externally much resembles the present species, but differs in the cylindrical paraphyses having a spherical, and not clavate apex.

## ACETABULA. Fuckel.

Ascophore fleshy, cup-shaped at maturity, glabrous or scurfy; stipitate, stem stout, often ribbed; hypothecium composed of densely interwoven, septate hyphae; cortex parenchymatous; asci cylindrical, 8-spored; spores elliptical, hyaline, continuous, 1-seriate; paraphyses present.

*Acetabula*, Fuckel, Symb. Myc., p. 330.

*Peziza*, or a section of *Peziza* of authors.

The distinct, stout stem is usually furnished with more or less strongly raised ribs, which frequently pass for some distance up the outside of the ascophore in the form of branching veins.

*Acetabula vulgaris*. Fekl., Symb. Mycol., p. 330; Sacc., Syll., viii. n. 189.

Ascophore stipitate, cup-shaped, fleshy, rather tough, disc dark umber-brown, externally paler, and minutely scurfy or flocculose; mouth somewhat contracted; 3-5 cm. broad, 2.5-3.5 cm. high; stem 1-1.5 cm. high, often 1 cm. thick, imperfectly hollow, with parallel or anastomosing ribs, which continue for some distance up the ascophore as branching veins, pale umber; cells of the cortex give off short, rather closely septate hyphae in groups; asci cylindrical, 8-spored; spores obliquely 1-seriate, hyaline, smooth, broadly elliptical, ends obtuse, with a very large oil-globule,



18-22  $\times$  12-14  $\mu$ ; paraphyses straight, septate, the brownish, clavate tip 5-6  $\mu$  thick.

*Peziza acetabulum*, Linn., Sp. Pl., ii. 1650; Phil., Brit. Disc., p. 44, pl. iii., fig. 11.

On the ground. Spring.

The fluted stem and veined outside of the excipulum mark the present species. The colourless hypothecium is composed of very densely and compactly interwoven hyphae.

*Acetabula leucomelas*. Boud., Bull. Soc. Myc., i. p. 100; Sacc., Syll., viii. n. 195.

Ascophore stipitate, cup-shaped, 3-4 cm. broad and high, fleshy, rather tough; disc blackish-grey, margin often irregular; externally pallid or whitish, minutely rough; stem about  $\frac{1}{2}$ -1 cm. high,  $\frac{1}{2}$  cm. thick, pale, stuffed, externally lacunose or fluted, the ridges not extending to the ascophore; the cortical cells grow out in little clusters, asci cylindrical, 8-spored; spores hyaline, smooth, continuous, broadly elliptical, ends obtuse, with one very large oil-globule, 22-24  $\times$  12  $\mu$ ; paraphyses septate, 5-6  $\mu$  at the brownish, clavate tips.

*Peziza leucomelas*, Pers., Myc. Eur., i. p. 219, t. xxx., fig. 1, a-c.

On the ground in woods.

Specimen from Persoon in Hb. Kew, examined.

Distinguished from *A. vulgaris* by the whitish exterior, and the ribs on the stem not running up the ascophore. Hypothecium very compactly interwoven, hyaline. Saccardo says the spores become asperate; this character I have not observed.

### *Acetabula Percevalii*. Mass.

Solitary, stipitate, margin incurved and closed when young, then becoming saucer-shaped, the extreme margin still incurved, rather fleshy, 2-3 cm. across; disc umber-brown, externally paler, margin whitish, minutely rough; stem 2-3 cm. long, 1 cm. thick, usually narrowed downwards, more or less distinctly longitudinally sulcate or lacunose, pale; hypothecium and excipulum composed of loosely, interwoven, branched, septate, hyaline hyphae, 3-4  $\mu$  thick, running out into a parenchymatous cortex of irregularly polygonal cells, 5-7  $\mu$  diameter; asci cylindric-clavate,

apex obtuse; spores . . . . ?; paraphyses slender, septate, the clavate tips brown.

*Peziza Percevali*, Berk. & Cooke, Mycographia, fig. 192; Phil., Brit. Disc., p. 45.

*Geopyxis Percevali*, Sacc., Syll., viii. n. 234.

On the ground.

Appears to be very closely allied, if at all distinct from *A. leucomelas*.

### RHIZINA. Fries (emended). (figs. 4-7, p. 188.)

Ascophore sessile, expanded from the first, more or less concave below and furnished with root-like strands of mycelium or fibrillose, fleshy; asci cylindrical, 8-spored; spores continuous, elliptical or fusiform, hyaline, 1-seriate; paraphyses present.

*Rhizina*, Fr., Obs. Myc., i. p. 161; Phil., Brit. Disc., p. 40; Sacc., Syll., viii. p. 57.

Characterised by the expanded, marginate, crust-like ascophore, entirely covered with the hymenium on the upper surface, and attached to the substratum by rhizoids or downy fibrils proceeding from the under surface.

Allied to the genus *Sphaerosoma*; differing in being more broadly expanded, and in the elliptical spores. Judging from a knowledge of British species only, the genus *Psilopezia*, established by Berkeley, would by some be considered distinct, but when the entire series of species included in the genera *Rhizina* and *Psilopezia* is taken into consideration, it is found impossible to separate the two by any one character. It so happens that we have the two extremes of structure in our British species, *R. inflata* having the rhizoids more strongly developed than in any other known species, whereas in *R. Babingtonii* and *R. myrothecioides*, these structures are reduced to the form of fibrils.

*Rhizina inflata*. Quélet, Enchir., p. 272; Sacc., Syll., viii. n. 180. (figs. 4-9, p. 188.)

Crust-like, convex, irregularly undulated or nodulose, bay-brown or umber, margin paler and often slightly raised, thick and fleshy, form variable, irregularly orbicular or often lobed, under surface paler, more or less concave,

furnished with numerous stout fibrils by which the fungus is attached to the ground, 3-10 cm. across; hypothecium and excipulum brown, formed of stout, septate, irregularly inflated, interwoven hyphae which run out below to form the rhizoids; asci stout, cylindrical, apex truncate, 8-spored; spores obliquely 1-seriate, fusiform, ends rather acute, often 2-guttulate, hyaline, or the thick wall showing a tinge of brown at maturity,  $32-36 \times 9-10 \mu$ ; paraphyses slender, septate, tips brown, clavate,  $6-7 \mu$  thick, more or less agglutinated; mixed with the paraphyses are numerous bodies as long as the normal paraphyses, but stouter, clavate, with thicker walls, entirely brown, and without septa.

*Elvella inflata*, Schaeffer, pl. 153 (1774).

*Rhizina undulata*, Fr., Obs., i. p. 161 (1815); Phil., Brit. Disc., p. 40.

On sandy soil that has been burnt, also on peat.

Specimen in Cooke, Fung. Brit., ser. ii., n. 400, examined.

The spores may possibly become truly 1-septate at maturity.

*Var. rhizophora*. Mass.

More or less orbicular, 2-4 cm. across, convex, even, in other respects as in the typical form.

*Octospora rhizophora*, Hedw., Musc. Frond., ii. t. 5, fig. A (1787-1797).

*Rhizina laevigata*, Fries, Syst. Myc., ii. p. 33 (1821-1830); Phil., Brit. Disc., p. 41.

On sandy ground, also on stumps.

Specimen in Winter—Rab., Fung. Eur., n. 2406, examined.

Hartig—The Diseases of Trees, Engl. Ed., p. 123—says, “besides these [the paraphyses], there are present numerous non-septate secreting-tubes which project a little above the hymenium. These are filled with a brown secretion which pours over the surface as a slimy glutinous substance, swarming with bacteria. The bacteria also find their way between the paraphyses, so that it is scarcely possible to get a culture of spores that is free from them. It is these, too, which induce the rapid decay and solution of the entire ascophore.” The same author states that the present fungus is a very injurious parasitism, attacking the roots of young conifers and other trees, and killing them in a short time.

**Rhizina myrothectoides.** Mass.

Gregarious, suborbicular, almost or quite plane, rather thin, cartilaginous when dry, disc blackish-green, margin more or less torn, tomentose, yellowish, up to 1 cm. across; cortical cells large, polygonal; asci cylindrical, 8-spored; spores hyaline, continuous, elliptic-oblong, 1-2-guttulate, wall smooth, thick,  $18-20 \times 10-12 \mu$ ; obliquely 1-seriate; paraphyses septate, tips clavate and brownish, longer than the asci.

*Psilopezia myrothecioides*, B. & Br., Ann. Nat. Hist., n. 1489, t. 11, fig. 5; Phil., Brit. Disc., p. 111; Sacc., Syll., viii. n. 617.

On wood of *Prunus padus* and *Ulex Europaea*.

Very closely allied to *R. Babingtonii*; distinguished chiefly by the dark green disc, and yellowish, fimbriate margin.

Type specimen examined.

**Rhizina Babingtonii.** Mass.

Expanded from the first, slightly convex, rugulose, glabrous, greyish brown, subcircular or irregular in outline, rather fleshy, shrinking and becoming thin and cartilaginous when dry; under surface slightly concave, downy or fibrillose, 1-2 cm. across; cortical cells large, irregularly hexagonal; asci cylindrical, 8-spored; spores hyaline, continuous, elliptic-oblong, ends obtuse,  $16-18 \times 8-9 \mu$ , obliquely 1-seriate, 1-2-guttulate; paraphyses slender, septate, clavate and brownish at the tips, longer than the asci.

*Peziza Babingtonii*, Berk. & Br., Ann. Nat. Hist., n. 554.

*Psilopezia Babingtonii*, Berk., Outl., p. 373; Phil., Brit. Disc., p. 110, pl. v. fig. 23; Sacc., Syll., n. 614.

On rotten wood.

When dry the ascophore is very thin and cartilaginous and closely applied to the substratum.

Type specimen examined.

## HELVELLEAE.

The principal common feature of the present group is that the disc or hymenium is fully exposed from the earliest stage. There is an absence of the incurved margin of the ascophore when young, and the gradual exposure of the disc so

characteristic of the Pezizae. On the other hand, the transition from one family to the other is bridged by intermediate forms, included in the genus *Helvella* in the present work; for example, *Helvella bulbosa* and *Helvella corium* have the receptacle more or less incurved when young, but on the other hand these species possess more morphological points in common with the typical species of *Helvella* than with any members of the Pezizae. Another marked peculiarity is the gradual departure of the ascophore from the pezizoid or cup-shaped type. In *Helvella* there is the closest agreement with the cup-shaped form, although in some species we find the under surface of the pileus more or less adnate to the sides of the stem, and the pileus is always more or less drooping, thus fully exposing the hymenium. In *Verpa* the pileus is drooping and thimble-shaped, but free from the sides of the stem; whereas in *Mitrophora* the pileus is also drooping, but has its upper half adnate to the stem. In this genus we have the development of a new idea, the hymenium being covered with stout, raised, anastomosing ribs, by this arrangement the ascigerous area of the disc is much increased; this idea is continued in *Morchella* and *Gyromitra*. In the two last-named genera the pileus is large, hollow, and entirely adnate to the stem. Spathularia is a transition genus; *S. clavata* (= *S. flavida*) may be compared with *Gyromitra* or *Morchella*, differing in the large, hollow head being nearly smooth and very much compressed and flattened; other species differ but little from *Mitrula*, where the pileus is entirely adnate to the stem, and ovate or clavate. Finally we pass on to *Geoglossum*, where the slender stem is terminated upwards by the clavate head, differing only in being fertile. The last-named genus is the only one in the family having coloured spores.

### ANALYSIS OF THE GENERA.

#### A. Spores hyaline.

\* Margin only, or whole of pileus free from sides of stem.

**Helvella.** Pileus drooping, irregularly waved and lobed.

**Verpa.** Pileus drooping, regular, margin entire, thimble-shaped.

**Leotia.** Pileus fleshy, discoid; spores obliquely 1-2-seriate.

**Cudonia.** Pileus fleshy, discoid; spores very long and slender, arranged in a parallel fascicle in the ascus.

**Mitrophora.** Surface of pileus furnished with stout anastomosing ribs bounding deep, elongated pits; lower part of pileus free from stem.

*\*\* Pileus adnate throughout to the stem.*

*† Spores obliquely 1-2-seriate in the ascus.*

**Morchella.** Surface of pileus furnished with stout, anastomosing ribs bounding deep, irregular pits.

**Gyromitra.** Surface of pileus covered with rounded, variously contorted folds.

**Mitrula.** Pileus subglobose or clavate, surface even.

*†† Spores long and slender, arranged in a parallel fascicle in the ascus.*

**Spathularia.** Pileus flattened, running down the stem for some distance on opposite sides.

**Vibrissea.** Pileus capitate; spores remaining attached to the surface of the pileus for some time after escaping from the asci. Aquatic.

*B. Spores coloured.*

**Geoglossum.**

HELVELLA. Linn. (emended). (figs. 17, 18, p. 188.)

Ascophore stipitate, pileus irregular, not subglobose and closed when young, thin, formed of 2-4 drooping lobes, or crisped and irregularly wavy, often more or less attached to the stem for some distance down; under surface glabrous, minutely velvety or furfuraceous, sometimes rugulose or veined; stem elongated, either stout or slender, often lacunose or ribbed; hypothecium and excipulum formed of densely interwoven hyphae, which pass into a cortex of large cells; asci cylindrical, 8-spored; spores hyaline, continuous, elliptical, 1-seriate; paraphyses septate, clavate.

*Helvella*, Linn., Sp. Pl., 1648 (1763); Fries, Syst. Myc., ii. p. 14; Phil., Brit. Disc., p. 9; Sacc., Syll., viii. p. 17.

The present genus connects the *Peziza* with the *Helvelleae*, differing from the former in the ascophore not being succulent and fleshy, and in not being closed at first and gradually expanding. Certain species included in *Helvella* approach *Peziza* in the character mentioned, but their general structure is that of *Helvella* rather than that of the stipitate *Pezizae* included in the genera *Geopyxis* and *Acetabula*.

Growing on the ground, rarely on rotten wood.

\* *Pileus adnate with the sides of the stem.*

*Helvella crispa*. Fries, Syst. Myc., ii. p. 14; Cooke, Mycogr., fig. 159; Phil., Brit. Disc., p. 10; Sacc., Syll., viii. n. 42. (figs. 17, 18, p. 188).

Pileus drooping, inflated and lobed, margin wavy, at first adhering to the sides of the stem but soon quite free, minutely pruinose, otherwise quite glabrous, fragile and almost translucent, whitish or tinged yellow, 4-7 cm. across; stem 6-10 cm. high, 2-4 cm. thick above usually narrowed upwards, with stout anastomosing, more or less plane ribs enclosing irregular elongated pits, hollow, as are also the ribs, minutely pruinose, otherwise glabrous, pure white then tinged yellowish; hypothecium and excipulum formed of hyaline, slender, densely interwoven hyphae, which pass into a large-celled cortex; asci cylindrical, 8-spored; spores



hyaline, continuous, elliptical, ends obtuse,  $17-18 \times 9-10 \mu$ ; paraphyses hyaline, septate, slender, slightly clavate, a trifle longer than the asci.

On the ground. Autumn. Edible.

Specimen in Phil., Elv. Brit., n. 102, examined.

Distinguished from all other species by the stout, costate, lacunose, hollow stem; entirely glabrous, fragile, and with a semi-transparent look. Colour variable, included under the following forms:—

*Forma alba.* Pileus whitish.

*Forma Grevillei.* Under surface of the pileus reddish; stem white.

*Forma incarnata.* Pileus and stem flesh-colour.

*Forma fulva.* Pileus yellowish or tawny.

*Helvella lacunosa.* Afzel., Vet. Ac. Hd., 1873, p. 303; Phil., Brit. Disc., p. 11; Sacc., Syll., viii. n. 46.

Ascophore irregular, often irregularly inflated, dark grey or blackish-grey, irregularly lobed, lobes drooping and attached to the stem by the under surface,  $1\frac{1}{2}-5$  cm. high; excipulum composed of densely interwoven hyphae, which run out at the periphery into parallel, clavate, septate hyphae,  $10-20 \mu$  thick at the tip; stem,  $1.5-5$  cm. long,  $\frac{1}{2}-1\frac{1}{2}$  cm. thick, variously ribbed or lacunose, pallid; asci cylindrical, 8-spored; spores obliquely 1-seriate, broadly elliptical, ends obtuse, smooth, hyaline, continuous, with 1 very large globose oil-globule,  $18-20 \times 10-12 \mu$ ; paraphyses septate, becoming gradually clavate up to the brownish tip, which is  $6-10 \mu$  thick.

*Helvella sulcata*, Afz., Vet. Ac. Handl., 1873, p. 306; Phil., Brit. Disc., p. 12; Sacc., Syll., n. 48.

On the ground in woods. Spring and autumn.

Solitary or gregarious; very variable in size, as also in the inflation of the ascophore and the ribbing of the stem, but an examination of numerous specimens in various exsiccati under both names given above proves that all are forms of one variable species, and all agree in the above characters.

*Helvella infula.* Schaeff., Fung. Bavar. et Palat., pl. 159; Cooke, Mycogr., fig. 334; Phil., Brit. Disc., p. 13; Gillet, Disc. Fr., p. 11; Sacc., Syll., viii. n. 57.

Pileus hooded, in 2-4 irregular, drooping lobes, at length undulate, strongly adherent to the sides of the stem, reddish-brown or cinnamon more or less deep in colour, whitish and downy underneath, 4-8 cm. broad; stem, 3-6 cm. long, 1 cm. and more thick, usually smooth and even, sometimes compressed and irregularly lacunose, pallid or tinged with red, covered with a white meal or down, solid when young but becoming hollow with age; asci cylindrical, apex somewhat truncate, 8-spored; spores 1-seriate, hyaline, smooth, continuous, elliptical, ends obtuse,  $21-23 \times 11-12 \mu$ ; paraphyses septate, clavate and brown at the tips.

On the ground in woods.

Differs from *H. guepinioides* in the pileus being adnate to the stem, and from *H. monachella* in the stem not being glabrous.

Specimen in Roum., Fung. Gall., 1208, examined.

The Brandon specimens were very variable in form and size; pileus sometimes nearly globose, bullate, and wrinkled, at others expanded, and unequally lobed at the margin; the stem attenuated upwards or in the centre; varying in height from 3 to 7 inches; the paraphyses branched, septate, pyriform at the apices; sporidia furnished with two large guttulæ,  $18-22 \times 8 \mu$ . Probably esculent. (Phillips, Brit. Disc., p. 14.) Is this the right species?

**Helvella monachella.** Fries, Syst. Myc., ii. p. 18; Phil., Brit. Disc., p. 14; Cooke, Mycogr., fig. 335; Sacc., Syll., viii. n. 62.

Pileus drooping, irregularly lobed and folded, depressed at the centre, adnate to the sides of the stem, pale brown or sometimes almost bay, paler below, 3-4 cm. broad; stem, 2-4 cm. long, about 1 cm. thick, narrowed more or less upwards, hollow, becoming compressed and sometimes lacunose on one side at the base, white, minutely pubescent at first, then quite glabrous; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1 seriate, hyaline, smooth, continuous, broadly elliptical, ends obtuse,  $16-17 \times 10 \mu$ ; paraphyses septate, brown at the clavate tips.

On the ground in woods.

Distinguished by the hollow, white, glabrous, almost even stem, and adnate pileus.

Fries says the pileus is variable in colour: brown, bay, violaceous, or blackish.

Specimen in Thüm., Fung. Austr., n. 11, examined.

**Helvella fusca.** Gillet, Disc. France, p. 9, with fig.; Sacc., Syll., viii. n. 50.

Pileus composed of 2-3 irregular, crisped, waved, and strongly-reflexed lobes, attached to the stem for some distance by narrow portions, dingy bay or dark ochraceous, margin usually paler; under surface dingy white or greyish, covered with a network of raised veins, about 3 cm. across; stem 5-6 cm. long, 1 cm. thick, slightly thickened at the base, deeply and irregularly lacunose, dingy white or coloured like the pileus except near the summit; asci cylindrical, 8-spored; spores 1-seriate, broadly elliptical or nearly globose, hyaline, with a large oil-globule,  $16-17 \times 10 \mu$ ; paraphyses slender, septate, apex clavate.

On the ground among grass, &c.

With the general build of *H. lacunosa*, but readily distinguished by the dingy ochraceous brown colour of the pileus, and the strongly-veined under surface.

\*\* *Pileus free from the sides of the stem.*

† *Stem glabrous or nearly so.*

**Helvella subcostata.** Cooke, Mycogr., p. 90, fig. 162; Phil., Brit. Disc., p. 13.

Pileus inflated, margin drooping irregularly wavy, spreading, centre depressed, free from the sides of the stem, thin, pale dingy yellowish-brown (when dry), 4-5 cm. across, under surface paler, traversed with strong, radiating branching ribs; stem stout, 4-5 cm. long, 1.5 cm. thick, equal throughout, longitudinally ribbed, ribs often branching; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, hyaline, continuous, elliptical, ends obtuse, 1-guttulate,  $17-19 \times 10-11 \mu$ ; paraphyses septate, the brown clavate tips 7-8  $\mu$  thick.

On the ground.

Distinguished by the cylindrical, stout, grooved stem, and the strong, branching ribs on the under surface of the

pileus, which radiate from the stem. Tips of paraphyses brown.

Type specimen examined.

*Helvella guepinioides*. Berk. & Cooke, in Herb. Berk., Cke., Mycogr., fig. 337; Phil., Brit. Disc., p. 15; Gillet, Disc. Fr., p. 12, fig. 12; Sacc., Syll., viii. n. 65.

Pileus nearly entire, strongly drooping on opposite sides and deeply depressed at the centre, margin usually slightly wavy, free from the sides of the stem, ochraceous, paler, smooth and almost glabrous below, 2-4 cm. across; stem, 4-8 cm. high, up to 1 cm. across, nearly equal and even, hollow, almost glabrous, white or with a more or less decided tinge of yellow, sometimes with an indication of becoming lacunose; asci cylindrical, apex somewhat truncate, 8-spored; spores smooth, continuous, hyaline, elliptical, ends obtuse,  $18-20 \times 10-11 \mu$ ; paraphyses septate, tips clavate.

On the ground.

Distinguished from *H. monachella* by the pileus being free from the sides of the stem, and from *H. infula* by the stem being hollow from the first, and glabrous.

Type specimen examined.

*Helvella Klotzschiana*. Corda, in Sturm's Fl. Deutschl., vol. iii. pl. 57; Cooke, Mycogr., fig. 168; Phil., Brit. Disc., p. 18; Sacc., Syll., viii. n. 78.

Pileus formed of two drooping lobes, more or less depressed at the centre, thin, even, opaque brown, margin generally wavy, even and pale yellow underneath, 1.5-2 cm. broad; stem cylindrical or slightly thickened at the extreme base, 2-3 cm. long, even, pale yellow, nearly glabrous, inside white; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, elliptical,  $11-13 \times 5-6 \mu$ ; paraphyses slender, the clavate tips brown.

On the ground.

Known by the yellowish colour of the under side of the pileus and stem.

A Welsh specimen determined by Berkeley accepted as typical.

*Helvella bulbosa*. Mass.

Ascophore stipitate, globose and closed at first, then ex-

panded, thin, somewhat leathery,  $1\frac{1}{2}$ – $2\frac{1}{2}$  cm. across; disc umber-brown, externally greyish and minutely flocculose, stem firm, almost equal, base more or less bulbous, even or slightly lacunose, 1–2 cm. long, 2–3 mm. thick; hypothecium and excipulum formed of interwoven hyphae, which run out into parallel, clavate, septate ends to form the cortex; asci cylindrical, apex truncate, 8-spored; spores 1-seriate, hyaline, continuous, smooth, broadly elliptical, with a large, central oil-globule;  $15$ – $17 \times 10$ – $11 \mu$ ; paraphyses slender, septate, the slightly clavate tips brownish.

*Octospora bulbosa*, Hedw., Musc. Frond., t. x. fig. c.

*Peziza bulbosa*, Nees, Syst., f. 289; Cke., Mycogr., fig. 189.

*Lachnea bulbosa*, Phil., Brit. Disc., p. 205.

*Macropodia bulbosa*, Sacc., Syll., viii. n. 638.

On the ground.

Specimen in Rab., Fung. Eur., n. 1308, examined.

The present species approaches the *Pezizae* in having the ascophore globose and closed when young; but the general build and the structure of the ascophore is much more in agreement with *Helvella* than with any genus included in the *Pezizae*.

### *Helvella corium*. Mass.

Ascophore stipitate, somewhat waxy, rather coriaceous when dry; saucer-shaped then more expanded, sometimes compressed laterally, 1–5 cm. across; disc black with a tinge of brown, externally paler and minutely velvety; excipulum white, composed of interwoven hyphae which run out into free, clustered, septate brownish hairs,  $30$ – $40 \times 8$ – $12 \mu$ ; stem 1–3 cm. long, 4–5 mm. thick at base, usually thinner upwards, glabrous, grooved or wrinkled, brown, base usually paler; asci cylindrical, 8-spored, spores obliquely 1-seriate, smooth, hyaline, usually 1-guttulate, elliptical, ends very obtuse,  $18$ – $20 \times 10 \mu$ ; paraphyses clavate, apex brown and often rather constricted at the uppermost septum, giving the tip a moniliform appearance.

*Peziza corium*, Web., Pilze, t. iii., fig. 7; Cooke, Mycogr., fig. 187.

*Lachnea corium*, Phil., Brit. Disc., p. 204.

*Macropodia corium*, Sacc., Syll., viii. n. 639.

On sandy ground. Spring.

The entire structure of the present species is that of *Helvella*, and not of *Peziza*.

*Helvella pulla*. Holmskiöld, *Atræ Fung. Dan.*, t. 26; Cooke, *Mycogr.*, fig. 338; Phil., *Brit. Disc.*, p. 17; Sacc., *Syll.*, viii. n. 77.

Pileus formed of usually two reniform, broadly emarginate lobes, which are drooping and pressed to the stem—but free from it—afterwards becoming inflated, more or less spreading, and wavy, blackish above, smoky and almost glabrous underneath, 2–3 cm. broad; stem 3–6 cm. long, rather slender, narrowed upwards, often irregularly lacunose near the base, nearly glabrous, smoky grey, solid at first, then hollow; hypothecium and exipulum formed of interwoven hyphae, running out into parallel, clavate, septate hyphae to form the cortex; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, broadly elliptical, ends obtuse, 1-guttulate,  $15\text{--}17 \times 12 \mu$ ; paraphyses septate, clavate, tinged brown.

On damp ground in woods, also on rotten trunks.

Resembling *H. atra*, but readily distinguished by the nearly or quite glabrous stem.

Specimen named by Fries in *Herb.*, Kew, examined.

†† *Stem densely villose or scurfy.*

*Helvella helvelloides*. Mass.

Ascophore stipitate, rather thin, cup-shaped, then expanded and plane, the margin at length drooping, blackish-brown; externally rough with minute scurf-like warts,  $1\frac{1}{2}$ –2 cm. across; excipulum formed of interwoven hyphae which at the periphery run out into clusters of septate hyphae, 8–12  $\mu$  thick; stem 2–5 cm. long, 3–4 mm. thick, almost equal and even, scurfy; asci clavate, 8-spored; spores 1-seriate, elliptical, ends obtuse, smooth, hyaline,  $18\text{--}20 \times 9\text{--}10 \mu$ , with a hyaline thick wall; paraphyses clavate, tip 6–8  $\mu$  broad.

*Helvella pezizoides*, Afzel., *Vet. Acad. Handl.*, 1873, p. 308, t. 10, f. 2; Sacc., *Syll.*, viii. n. 82.

*Peziza helvelloides*, Fr., *Summa Veg. Scand.*, p. 348; Cooke, *Mycogr.*, fig. 190

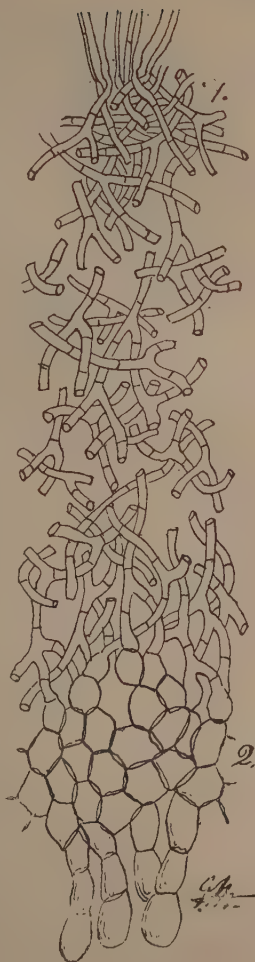
*Lachnea helvelloides*, Phil., *Brit. Disc.*, p. 206.

In pine woods, among moss, &c.  
Specimen from Fries examined.

The present species has by some authorities been placed in the genus *Peziza*, used in the broader sense, on account of the concave or cup-shaped form of the young ascophore, but the entire structure is that of *Helvella*.

*Helvella atra*. König,  
Zoega. Fl. Isl., p. 20; Cke., Mycogr.,  
fig. 167; Phil., Brit. Disc., p. 16;  
Sacc., Syll., viii. n. 81.

Solitary, sooty-black or black with a purple shade; pileus drooping on opposite sides, depressed at the centre, usually free from the stem at the sides but close to it, thin, dingy grey when dry, even underneath and minutely furfuraceous, dingy grey, 1.5-2.5 cm. across; margin inclined to turn upwards; stem 3-5 cm. long, about  $\frac{1}{3}$  mm. thick, often slightly thickened and more or less lacunose near the base, which is greyish-olive, remainder black, furfuraceo-villose, stuffed; hypothecium and excipulum formed of hyaline, densely interwoven hyphae which pass into a large celled, parenchymatous cortex, the external cells of which run out in chains, clusters of which



*Helvella helvelloides*, Mass. Section through the ascophore; the hypothecium (1) is formed of densely interwoven branched septate hyphae; at the central portion the texture is looser, and changes at the cortex (2) into a parenchyma of polygonal cells, many of which run out into hairs forming the scurfy exterior.



form the furfuraceous exterior; asci cylindrical, 8-spored; spores hyaline, continuous, 1-guttulate, elliptical, ends obtuse, smooth,  $16-18 \times 8-9 \mu$ , obliquely 1-seriate; paraphyses septate, becoming gradually clavate upwards, apex  $7-8 \mu$  broad, brown.

*Elvela atra*, Flor. Dan., pl. 534, fig. 1.

In damp woods.

Distinguished by the blackish colour of every part and the furfuraceous stem.

Specimen in Karst., Fung. Fenn. n. 446, examined.

Readily distinguished by the small size, and more especially by the scurfy-villose under surface of the pileus and stem. The British specimens collected by Berkeley and figured by Cooke in *Mycographia*, fig. 169, are stouter than the typical form, and have an olive-brown disc, but in other respects are identical. The typical form has also been collected in Yorkshire.

***Helvella ephippium*.** Lév., Ann. Sci. Nat., ser. ii., vol. xvi. p. 241, pl. 16, fig. 7; Cke., *Mycogr.*, fig. 169; Gill., *Disc. Fr.*, p. 13, with fig.; Phil., *Brit. Disc.*, p. 18; Sacc., *Syll.*, viii. n. 83.

Pileus 2-3-lobed, bent down and often saddle-shaped, thin, bistre or greyish, under surface greyish and scurfy-villose, 1-2 cm. across; stem 1-2 cm. high, thin, stuffed, even, firm and elastic, scurfy-villose, greyish; hypothecium and excipulum formed of thin, hyaline, interwoven hyphae which become pseudoparenchymatous at the cortex, and run out into groups of clavate, septate hyphae forming the scurfy exterior; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, hyaline, smooth, continuous, broadly elliptical, ends obtuse, 1-guttulate,  $16-18 \times 10 \mu$ ; paraphyses septate, becoming gradually clavate, apex  $6 \mu$  thick, brownish.

On the ground among grass.

Specimen collected by Roberge examined.

***Helvella elastica*.** Bull., *Champ. France*, p. 289, t. 242; Cooke, *Mycogr.*, fig. 163; Phil., *Brit. Disc.*, p. 15; Sacc., *Syll.*, viii. n. 68.

Pileus free from the stem, drooping, 2-3-lobed, centre depressed, even, whitish, brownish, or fuliginous, almost

smooth underneath, about 2 cm. broad; stem 5-9 cm. high,  $\frac{1}{2}$ - $\frac{3}{4}$  cm. thick at the inflated base; tapering upwards, elastic, even or often more or less lacunose, coloured like the pileus, minutely velvety or furfuraceous, at first solid, then hollow; excipulum and hypothecium formed of densely interwoven, hyaline hyphae, these pass into large, more or less oblong cells, from the outer ends of which spring 2-4 slender, septate hyphae, these are arranged parallel, and form the outer surface; asci cylindrical, 8-spored; spores hyaline, smooth, continuous, elliptical, ends obtuse, often 1-guttulate,  $18-20 \times 10-11 \mu$ ; 1-seriate; paraphyses septate, clavate.

On the ground in damp woods, &c.

*Helvella macropus* superficially resembles the present species, but is distinguished by the rough exterior of the ascophore, and the larger spores.

*Helvella macropus*. Karsten, Myc. Fenn., p. 37; Sacc., Syll., viii. n. 84.

Ascophore stipitate, subglobose and the margin incurved at first, then expanded, rather thin, 2-5 cm. across, disc brown, externally greyish and minutely rough with small irregular warts formed by the outgrowth of pale brown, somewhat clavate, septate hyphae, constricted more or less at the septa,  $8-12 \mu$  thick; stem 3-7 cm. high, up to  $\frac{2}{3}$  cm. thick at the base, thinner upwards, often more or less lacunose, imperfectly hollow with age, greyish, covered with very minutely velvety warts; excipulum of densely interwoven hyphae that become parenchymatous at the cortex; asci cylindrical, 8-spored, spores 1-seriate, smooth, hyaline, elliptical,  $28-33 \times 11-13 \mu$ ; paraphyses straight, tips brownish and thickened in a clavate manner up to  $8-10 \mu$ .

*Peziza macropus*, Pers., Obs., ii. p. 26, t. 1, f. 2.

*Lachnea macropus*, Phil., Brit. Disc., p. 207.

On the ground in shady places. Summer and autumn.

Solitary, 1-3 inches high, cups 1-2 inches broad. The cups become expanded, and sometimes reflexed; the exterior is cinereous, and clothed with little hairy or villous warts, the hairs consisting of oblong concatenate cells, their extremities free. The stem is enlarged downwards, often lacunose, occasionally becoming hollow with age. (Phil.)

The spores are figured as narrowly elliptical, ends acute, and minutely asperate by Cooke in "Mycographia," pl. 188. Phillips also describes the spores as "fusiform-elliptic; becoming slightly asperate." I have not met with this form of spore, neither have I observed the asperate surface. The diagnosis given above agrees with specimens in Cooke's Fung. Brit., 289.

VERPA. Swartz. (figs. 19-21, p. 188.)

Ascophore stipitate, campanulate, attached to the tip of the stem and hanging down like a bell, surrounding but free from the side of the stem, regular, smooth or slightly wrinkled but not ribbed, persistent, thin, excipulum formed of interwoven, septate hyphae, hymenium entirely covering the outer surface of the ascophore; asci cylindrical, 8-spored; spores elliptical, continuous, hyaline or nearly so, 1-seriate; paraphyses septate; stem elongated, stuffed.

*Verpa*, Swartz, Vet. Acad. Handl. 1815, p. 129; Phil., Brit. Disc., p. 19; Sacc., Syll., viii. p. 29.

Very closely allied to *Helvella*; distinguished by the ascophore being more regular in form, and more evidently deflexed round the apex of the stem, which it surrounds like a thimble on a finger, and is quite free from the stem except at the apex.

The species grow on the ground in spring.

***Verpa digitaliformis*.** Pers., Myc. Eur., p. 203, t. 7, figs. 1-3; Phil., Brit. Disc., p. 19; Sacc., Syll., viii. n. 87 (figs. 19-21, p. 188).

Ascophore stipitate, campanulate, apex obtuse, rugulose, umber, pale and minutely downy underneath, 1.5-2.5 cm. high, thin, excipulum composed of septate, hyaline, intricately interwoven hyphae, 6-7  $\mu$  thick; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, continuous, elliptical, hyaline or with a yellow tinge, 21-24  $\times$  12-14  $\mu$ ; paraphyses stout, septate, tips thickened, brownish, 7-8  $\mu$  thick; stem, 5-7 cm. long, 1 cm. thick, equal or slightly ventricose, loosely stuffed, whitish, ornamented with very minute, concentrically arranged squamules.

On banks under shrubs, hedges, &c. Spring.

Specimen examined from Roum., Fung. Sel., exs., n. 4554.

Pileus at first nearly even, olivaceous umber, dark at the apex. Stem obese, furnished at the base with a few subrufous radicles, white with a slight rufous tinge, marked with transverse rufous spots; smooth to the naked eye, but under a lens clothed with fine adpressed flocci, the rupture of which gives rise to the spots, which are, in fact, minute scales. In the mature plant the pileus is  $\frac{3}{4}$  of an inch high, campanulate, digitaliform, or subglobose, more or less closely pressed to the stem, but always free, the edge sometimes inflexed so as to form a white border, wrinkled, but not reticulated, under side slightly pubescent; sporidia yellowish, elliptic; stem 3 inches high,  $\frac{1}{2}$  an inch or more thick, slightly attenuated downwards, loosely stuffed, by no means hollow. (Berk.)

*Verpa rufipes*. Phil., Brit. Disc., p. 20, pl. 1, fig. 4; Sacc., Syll., viii. n. 90.

Ascophore stipitate, obtusely conical, rugulose, somewhat lobed, umber, whitish and tomentose beneath,  $1\frac{1}{2}$ –2 cm. high; excipulum consisting of interwoven, septate, hyaline hyphae, about 5–6  $\mu$  thick; asci cylindrical, apex rounded, 8-spored; spores obliquely 1-seriate, continuous, elliptical, smooth, 20–22  $\times$  12–14  $\mu$ ; paraphyses numerous, straight, septate, stout, apex slightly thickened, 7–8  $\mu$  thick, tinged pale brown, as are also the spores and asci at maturity; stem somewhat ventricose, 4–5 cm. high, nearly 1 cm. thick at the widest part, rufous, squamulose, stuffed.

On hedge-banks. Spring.

The pileus is thin, wrinkled, dark umber, and stands well away from the stem; it is nearly white on the under side. The stem is much slenderer at the top than below, and is tinged within, at the base, with the rufous colour of the outside. Height about  $1\frac{1}{2}$  inches; broadest part of stem,  $\frac{3}{8}$  of an inch; pileus  $\frac{3}{4}$  of an inch high. This is intermediate between *conica* and *digitaliformis*. (Phillips.)

Specimen examined in Phillips' Elv. Brit., exs., n. 52, issued under the name of *Verpa digitaliformis*.

I think that the present species will prove to be nothing more than a form of *V. digitaliformis*, differing in the some-

what conical ascophore and the rufous stem. In the dried condition the two are undistinguishable.

*Doubtful species.*

**Verpa Relhani.** Sow.

The whole plant yellowish-brown, disc darkest; ascophore rather acutely conical, rugulose, up to 1 cm. high; stem hollow, slightly tapering upwards, 4-5 cm. high, 3 mm. thick.

The above describes the general appearance of the fungus called *Helvella Relhani* by Sowerby, and figured on plate xi. of Eng. Fung. There is no type specimen to refer to, hence nothing of detail can be added to the description. Phillips and others consider that Sowerby's plant is synonymous with the *Phallus conicus* of Flor. Dan., pl. 654, probably because Sowerby mentions the latter figure; but the two, so far as figures go—and there is nothing else to deal with—are very distinct. The following is Sowerby's account:—

The Rev. Mr. Relhan found three specimens of this plant growing at a little distance from each other on the north side of Gogmagog hills. The upper side of the pileus was silky, and the edges slightly fringed with the same silky membrane, like *Agaricus araneosus*. There seems some affinity between this little fungus and *Lycoperdon phalloides*, Dicks, Fasc. i. 24, figured by Mr. Woodward in the Phil. Trans., vol. lxxiv. 423, t. 16, and in Dr. Smith's Spicilegium, t. 12. See also *Phallus conicus*, Flo. Dan., t. 1554. (Sowerby.)

Sowerby's reference to Flor. Dan., 1554, is a mistake, and should be pl. 654, lower fig. His *Ag. araneosus* = *Cortinarius spilomeus*, Fr, and *Lyc. phalloides* = *Battarreia phalloides*, Pers.

**LEOTIA.** Hill (emended). (figs. 25-27, p. 188.)

Ascophore stipitate, substance fleshy, soft and somewhat gelatinous; pileus orbicular, spreading; margin drooping or incurved free from the stem, glabrous, hymenium entirely covering the upper surface; stem central, elongated; asci cylindric-clavate, apex narrowed, 8-spored; spores hyaline,

continuous or 1-septate, elongated and narrowly elliptical, obliquely 1-2-seriate; paraphyses present.

*Leotia*, Hill, Hist. Plant., p. 79 (1751); Phil., Brit. Disc., p. 21; Sacc., Syll., viii. p. 609 (in part).

Distinguished by the pileate, entire receptacle supported on an elongated, central stem, and by the subgelatinous consistency of every part. On account of the character last named, the genus is placed in the Bulgaricae by Saccardo; but the general structure agrees more with the Helvelleae, which includes other species having the same subgelatinous substance, as species of *Geoglossum*, *Vibrissea* and *Mitrula*.

Growing on the ground, or on decaying wood.

*Leotia lubrica*. Pers., Syn. Fung., p. 613; Phil., Brit. Disc., p. 22; Sacc., Syll., viii. n. 2510.

Gregarious or in small clusters, stipitate, somewhat gelatinous, pileus irregularly hemispherical, inflated, wavy, margin very obtuse, yellowish olive-green, 1.5-2 cm. across; stem 3-5 cm. high, nearly equal or more or less inflated at the base, pulpy within then hollow, externally yellowish and covered with minute, white granules; asci cylindrical, apex slightly narrowed, 8-spored; spores obliquely 1-seriate, hyaline, continuous, smooth, often guttulate, narrowly elliptical, straight or very slightly curved,  $22-25 \times 5-6 \mu$ ; paraphyses slender, cylindrical, hyaline.

On the ground in woods. Summer and autumn.

Specimen in Herb. Kew, named by Persoon, examined.

*Leotia chlorocephala*. Schw., Syn., p. 33; Phil., Brit. Disc., p. 23; Mycogr., fig. 174; Sacc., Syll., viii. n. 2511.

Caespitose, stipitate, pileus depresso-globose, somewhat translucent, more or less wavy, margin incurved, dark verdigris-green to blackish-green, 1-1.5 cm. across; stem 4-8 cm. long, almost equal, green, but often paler than the pileus, pulverulent, often twisted; asci cylindric-clavate, apex rather narrowed, 8-spored; spores smooth, hyaline, narrowly elliptical, ends acute, often slightly curved, usually 2-3-guttulate,  $17-20 \times 5 \mu$ , irregularly 2-seriate; paraphyses slender, hyaline.

On the ground.

Distinguished from *L. lubrica* by the green stem.



Specimen determined by Berkeley accepted as typical.

*Forma Stevensoni*, B. & Br., Ann. Nat. Hist., n. 1827.

Short, densely caespitose; pileus and stem green.

On damp ground in woods.

*Leotia acicularis*. Pers., Obs., ii. p. 20, t. 5, fig. 1; Phil., Brit. Disc., p. 25.

Gregarious or scattered, entirely white, rarely pallid or tinged rufescent, dry; pileus at first plane and slightly umbilicate, then convex, margin drooping, sometimes wavy, granular beneath, sometimes cup-shaped; stem 1-2 cm. high, slender, simple or branched, often crooked, becoming discoloured; asci clavate, apex narrowed, 8-spored; spores irregularly 2-seriate above, 1-seriate below, elliptical, ends acute, 2-guttulate then 1-septate, hyaline,  $18-22 \times 4-5 \mu$ ; paraphyses very slender, not thickened at the tips.

*Helvella agariciformis*, Bolton, Fung., t. 98, fig. 1; Sow., Engl. Fung., t. 57.

*Leotia Queletii*, Cke., Mycogr., fig. 369.

*Cudoniella Queletii*, Sacc., Syll., viii. n. 133.

On decaying stumps among moss.

Resembling a long-stemmed *Helotium* in general appearance; pileus fragile,

Specimen in Cooke, Fung. Brit., n. 400, examined.

## CUDONIA. Fries.

Ascophore stipitate, fleshy, convex and peltate, concave below, margin thick and incurved, solid; stem elongated, stout; excipulum dense, formed of branched, interwoven hyphae which form a loose, spongy tissue below; asci clavate, apex narrowed, 8-spored; spores hyaline, arranged in a parallel fascicle in the ascus, linear-clavate, for a long time multiguttulate, then multiseptate; paraphyses very slender, branched.

*Cudonia*, Fries, Summa Veg. Scand., p. 348.

Resembling the species of *Leotia* in form, but distinguished by the elongated, filiform spores, arranged in a parallel fascicle in the ascus. Saccardo—Syll. Fung., viii. p. 50—defines the present genus as having continuous spores, but



of the two species included, one—*C. circinans*—has multi-septate spores.

Growing on the ground in pine woods.

*Cudonia circinans*. Fries, Summa Veg. Scand., p. 348; Sacc., Syll., viii. n. 165.

Gregarious or caespitose, usually growing in circles; pileus fleshy, convex, becoming wavy, margin incurved, pale dingy yellow, often with a brown or pink tinge, glabrous, 1–2 cm. or more broad; stem 3–5 cm. long, about  $\frac{3}{8}$  cm. thick, often bent and grooved, glabrous, paler than the pileus; asci clavate, apex narrowed, 8-spored; spores hyaline, elongated, linear-clavate, multiguttulate for a long time, finally becoming multiseptate, curved when free,  $50-60 \times 2.5-3 \mu$ ; paraphyses very slender, branched, wavy at the tips, longer than the asci.

*Leotia circinans*, Pers., Comment., p. 31; Cooke, Mycogr., fig. 172; Phil., Brit. Disc., p. 24, pl. ii. fig. 5.

On the ground in fir woods.

Specimen in Fuckel, Fung. Rhen., n. 1139, examined.

The pileus is of a soft, fleshy consistence, somewhat rotund, at times much undulated, variable in colour with age and dryness, pallid-yellow, sometimes with a fleshy tinge; stem 1–2 inches high,  $\frac{1}{4}$  of an inch thick, crooked, often sulcate, solid or fistulose, expanding upwards into the pileus. (Phillips.)

The cells of the hypothecium show continuity of protoplasm as in *Spathularia*.

## MITROPHORA. Lév.

Ascophore stipitate; pileus conical or campanulate, the lower half free from the stem, surface furnished with stout anastomosing ribs enclosing deep, elongated pits; stem stout, elongated, hollow; asci cylindrical, 8-spored; spores hyaline, continuous, elliptical, 1-seriate; paraphyses septate, clavate.

*Mitrophora*, Lévêille, Ann. Sci. Nat., ser. iii., vol. v p. 249; (1846); Gillet, Champ. France, Disc., p. 17.

*Morchella*, Phil., Brit. Disc., p. 2; Sacc., Syll., viii. p. 8

Allied to *Morchella*, but differing in having the lower half of the pileus free from the stem.

Growing on the ground in spring. Edible.

**Mitrophora gigas**, Lév. Ann. Sci. Nat., 1846, p. 250.

Pileus conical, obtuse, free from the stem for some distance at the base, margin more or less wavy; ribs stout, deep, more or less longitudinal, branched and anastomosing, enclosing irregular, elongated pits, smoky brown or with an olive tinge, 5–8 cm. high, 5–6 cm. broad at the base; stem stout, elongated, whitish with minute rusty squamules, often more or less sulcate, hollow, 9–13 cm. high, 5–6 cm. thick at the base, narrower upwards; asci cylindrical, apex somewhat truncate, 8-spores; spores 1-seriate, hyaline, smooth, continuous, elliptical, ends obtuse,  $21-24 \times 11-14 \mu$ ; paraphyses septate, stout, clavate.

*Phallus gigas*, Batsch, Elench., p. 131.

*Morchella gigas*, Pers., Syn. Fung., p. 619; Phil., Brit. Disc., p. 6; Cooke, Mycogr., fig. 328; Sacc., Syll., viii. n. 21.

On the ground, especially in sandy places. Spring.

Agreeing with *M. semilibera* in having the base of the pileus free from the stem, but distinguished by its larger size, and by the stout, elongated stem being more or less sulcate, swollen at the base, and sprinkled with minute, rusty squamules.

Specimen in Fckl., Fung. Rhen., n. 2089, examined.

**Mitrophora semilibera**, Lév., Ann. Sci. Nat., 1846, p. 250.

Pileus conical, lower margin free from the stem about half-way up, ribs prominent, more or less longitudinal, but forking and anastomosing to form elongated pits, which are varied, yellowish or dingy tawny, sometimes with an olive tinge, edge of ribs often darker, 1.5–2.5 cm. high, and nearly as much across at the base; stem hollow, stout, often more or less thickened at the base, whitish or pallid, 4–7 cm. high, 1–2 cm. thick; asci cylindrical, apex rather truncate, pedicel elongated, 8-spored; spores hyaline, continuous, smooth, broadly elliptical,  $18-20 \times 12 \mu$ ; paraphyses hyaline, slender, septate, slightly clavate.

*Morchella semilibera*, D. C., Flor. Fr., ii. p. 212; Phil., Brit. Disc., p. 7; Cooke, Mycogr., fig. 321.

On the ground in woods. Spring.

Specimen in Phil., Elv. Brit., n. 51, examined.

MORCHELLA. Dill. (figs. 1-3, p. 188.)

Stipitate or subsessile; pileus globose, or ovate, adnate throughout its length to the sides of the stem, remaining closed at the apex, hollow and continuous with the cavity of the stem; externally furnished with stout, branched and anastomosing ribs or plates, every part bearing the hymenium; stem stout, stuffed or hollow; asci cylindrical, 2-4-8-spored; spores 1-seriate, continuous, hyaline, elliptical; paraphyses septate, clavate.

*Morchella*, Dillenius, Nov. Gen., p. 74 (1719); Phil., Brit. Disc., p. 2; Sacc., Syll., viii. p. 8 (in part).

Most nearly allied to *Gyromitra*; differs in the ribs of the pileus being deep and plate-like, and anastomosing to form elongated or irregularly polygonal, deep pits.

Growing on the ground in the spring.

***Morchella crassipes.*** Pers., Syn. Fung., p. 621; Cke., Mycogr., fig. 319; Phil., Brit. Disc., p. 5; Sacc., Syll., viii. n. 19.

Pileus broadly conical-ovate, obtuse, brownish, pits large, irregular in form, deep, base rugulose, not longer than broad, ribs stout, adnate at the base to the stem, hollow, the cavity continuous with that of the stem, 5-7 cm. high and almost as broad at the base; stem 2-3 times as long as the pileus, and nearly as thick at the lacunose base, slightly narrowed upwards, almost glabrous, pallid or tinged flesh-colour; asci cylindrical, apex somewhat truncate, 8-spored; spores obliquely 1-seriate, smooth, continuous, elliptical, ends obtuse, with a yellowish tinge at maturity,  $20-22 \times 11-12 \mu$ ; paraphyses septate, slightly thickened upwards.

On the ground. Spring.

Agreeing with *M. esculenta* in having the pits of the pileus irregular in form, not much, if at all, longer than broad, and in not having a main series of more or less parallel and vertical ribs; differing in the stout stem being much longer than the pileus.

Sometimes growing to a height of 25 cm.  
Specimen in Herb., Kew, accepted as typical.

**Var. *Smithiana*.**

Pileus subglobose, tawny; stem tomentose; spores 17–20  $\times$  8–11  $\mu$ ; otherwise as in the typical form.

*Morchella Smithiana*, Cooke, Mycogr., fig. 318; Grev., vol. xi. p. 98; Phil., Brit. Disc., p. 5; Sacc., Syll., n. 20.

*Morchella crassipes*, W. G. Smith, Journ. Bot., 1868, t. 73.

On the ground. Spring.

A fine, handsome species, reaching a height of 12 and a diameter of 7 inches. (Cke.)

***Morchella esculenta*.** Pers., Phil., Brit. Disc., p. 3; Cke., Mycogr., figs. 312–314; Sacc., Syll., viii. n. 8. (figs. 1–3, p. 188.)

Pileus globose, ovate, or oblong, adnate to the stem at the base, hollow, ribs stout, forming irregular, polygonal, deep pits, pale dingy yellow, buff, or tawny, 3–6 cm. high and broad; stem stout, whitish, almost even, hollow or stuffed, 3–6 cm. high, 2 cm. and more thick; asci cylindrical, 8-spored; spores continuous, smooth, hyaline, elliptical, ends obtuse, 19–20  $\times$  10; paraphyses rather slender, slightly thickened upwards.

*Phallus esculentus*, Linn., Suec., n. 1262.

On the ground. Spring and early summer. Edible.

Variable in form, size, and colour, but distinguished by the pileus being adnate to the stem at the base, and the stout ribs anastomosing to form irregular, polygonal pits of about equal size, and not elongated.

***Morchella elata*.** Fries, Syst. Myc., ii. p. 8; Sacc., Syll., viii. n. 14.

Ascophore obtusely conical, hollow, thin, adnate at the base, ribs strongly elevated, more or less parallel, thin and rather acute, rarely bifurcating or anastomosing, connected by slender transverse bars which are usually shallower than the main ribs, pale yellowish-brown; stem stout, hollow, very fragile, often more or less lacunose, furfuraceous, whitish or with a tinge of buff; asci large, cylindrical, apex obtuse, pedicel stout, often swollen at the base, 8-spored; spores 1-seriate, smooth, elliptical, ends obtuse, often 1–2-guttulate, contents becoming granular, 19–25  $\times$  14–15  $\mu$ ;

slightly tinged brown at maturity; paraphyses septate, gradually becoming clavate, 8–10  $\mu$  thick at the brownish tips.

In fir woods. Spring.

A very distinct and beautiful species, easily recognised by the deep, thin, more or less parallel ribs running from base to apex of the ascophore. The entire substance is thin. The usual size is about as follows: ascophore 5–7 cm. high and nearly as broad, stem 6–8 cm. long,  $2\frac{1}{2}$ – $3\frac{1}{2}$  cm. thick; but Irish specimens recorded by Mr. Greenwood Pim measured 25 cm. high, the ascophore being 12 cm. high, and nearly as much across.

Specimen from Fries, in Herb. Berk., Kew, examined.

*Morchella conica*. Pers., Comest., p. 257; Phil., Brit. Disc., p. 4; Cooke, Mycogr., fig. 315; Sacc., Syll., viii. n. 10 (fig. 31, p. 188).

Pileus stipitate, adnate at the base to the stem, elongated, slightly conical, or sometimes almost cylindrical, apex obtuse, hollow, the cavity continuous with that of the stem, primary ribs stout, deep, edge obtuse, irregularly longitudinal, often forking and anastomosing, joined by slender transverse ridges, thus forming irregular, elongated pits, greyish bistre or olive bistre, 4–7 cm. high, 2–3.5 cm. broad; stem cylindrical, whitish, minutely villose, hollow, 1.5–3 cm. high, 1 cm. more or less thick; asci at first cylindrical, then clavate, 8-spored; spores hyaline, continuous, smooth, elliptical,  $16\text{--}18 \times 8\text{--}9 \mu$ , 1-seriate at first, then irregularly 2-seriate; paraphyses septate, cylindrical or clavate, stout.

*Morchella conica*, var. *deliciosa*, Phil., Brit. Disc., p. 5.

On the ground. Edible.

Agreeing with *M. elata* in the longitudinal ribs of the pileus, but differing in its smaller size, and in the stem not being furfuraceous.

GYROMITRA. Fries. (figs. 14–16, p. 188.)

Ascophore stipitate; hymenophore subglobose, inflated and more or less hollow, or cavernous, variously gyrose and convolute at the surface, which is everywhere covered

with the hymenium; substance fleshy; asci cylindrical, 8-spored; spores uniseriate, elongated, hyaline or nearly so, continuous; paraphyses present.

*Gyromitra*, Fries, *Summa Veg. Scand.*, p. 346; Phil., Brit. Disc., p. 8; Sacc., Syll., viii. p. 15.

*Helvella*, of old authors.

Distinguished from *Morchella* by the thick, brain-like folds of the hymenophore not anastomosing to form irregularly polygonal depressions; and from *Helvella* in the hymenophore not being free from the stem at the base.

The species are amongst the largest of the Discomycetes, hymenophore bullate and subglobose; spores smooth. Edible. Rare everywhere. Growing on the ground.

*Gyromitra gigas*. Cooke, *Mycogr.*, p. 191, pl. 327; Phil., Brit. Disc., p. 9; Sacc., Syll., n. 32 (fig. 16, p. 188).

Hymenophore subglobose, 7–12 cm. diameter, cavernous, coarsely lobed or in irregular, wavy, overlapping pleats, more or less attached to the stem, colour variable, whitish, ochraceous, or with a brown or olive tinge; stem 2.5–4 cm. thick and long, cellular, waxy, whitish, more or less lacunose, almost glabrous; asci cylindrical, apex obtuse, base attenuated into a pedicel, and often curved; spores 8, obliquely uniseriate, hyaline, continuous, smooth, fusiform, ends rather acute, and often terminated by a minute papilla, often 1-guttulate,  $28\text{--}33 \times 10\text{--}12 \mu$ ; paraphyses numerous,  $3\text{--}4 \mu$  thick, apex broadly pyriform or sometimes rather irregular,  $7\text{--}8 \mu$  thick, brown, not septate.

*Helvella gigas*, Krombh., Schw., iii. p. 28, tab. 20, figs. 1–5.

On the ground.

Distinguished from *G. esculenta* by its fusiform spores, larger size, and paler colour. According to Krombholz the pileus may be deep clear yellow or brown.

*Gyromitra Phillipsii*. Mass.

The pilei varied in size from 3 in. to 3 feet in circumference, being in form globose, hemispherical, fusiform, or irregular; in the young state the folds of the hymenium were of the typical form of *Gyromitra*, but when older they became flattened into broad, pendent, crisped flounces, resembling fig. 327 in Cooke's *Mycographia*; while young they were creamy white, often tinged with pale purple,



passing with age into pale ochre, and then to fulvous-brown; stem short, thick, or sometimes absent. The flesh was somewhat waxy and exceedingly brittle. In section there was no sterile axis above the stem, the pileus consisting within of irregular cavities, divided and subdivided by double walls which were clothed with the hymenium. I found the asci to be cylindrical, furnished with eight elliptic sporidia [spores],  $10-12 \times 6-7 \mu$ ; paraphyses slender, somewhat thickened at the apices.

*Gyromitra gigas* (Krombh.), Cooke, Phillips in Journ. Bot., vol. xxxi. p. 129, pl. 334 (1893).

Sherborne, Oxfordshire, in a field on a hill-side, under beech-trees, having somewhat the appearance of *Sparassis crispa*.

The above is the account of a fungus which Phillips considers to be the true *Helvella gigas* of Krombholz, rather than the one accepted and figured by Cooke as such in Mycographia, fig. 327. Phillips considers that the spores of his specimens, measuring  $10-12 \times 6-7 \mu$  and 2-guttulate, are more in accordance with the figure of the spores given by Krombholz than with those figured by Cooke. I differ entirely from this opinion; we do not know the exact magnification of the spores figured by Krombholz, but in his diagnosis of the species he says, "sporis magnis," and his spores of *H. gigas* (= *Gyromitra gigas*) are slightly larger than the spores of his *Helvella esculenta* (= *Gyromitra esculenta*), figured on the same page, which is in accordance with the views of Cooke, but certainly not of Phillips. Under the circumstances, I consider the plant noted by Phillips as a previously undescribed species, remarkable for its great size, as also for its very small spores.

*Gyromitra esculenta*. Fries, Summa Veg. Scand., p. 346; Phil., Disc. Brit., p. 8, pl. 1, fig. 2; Cooke, Mycogr., fig. 328; Sacc., Syll., viii. n. 35. (figs. 14, 15, p. 188.)

Hymenophore subglobose, rather depressed, 4-7 cm. across, 3-6 cm. high, irregularly hollow, undulated, wavy and rugose, margin attached here and there to the stem, brown; stem 3-7 cm. high, 2-3 cm. thick, even or more or less lacunose, sometimes attenuated upwards, whitish, minutely downy, stuffed then hollow; asci cylindrical, apex obtuse,



base attenuated, 8-spored; spores obliquely uniseriate, hyaline, smooth, continuous, elliptical, ends obtuse, often 2-guttulate,  $17-25 \times 9-11 \mu$ ; paraphyses numerous, the upper half gradually becoming broader,  $5-6 \mu$  thick at the apex and brownish, septate.

*Helvella esculenta*, Pers., Comm., p. 64; Badham, Esc. Fung., ii. t. 12, figs. 3-5.

On the ground, sandy or scorched places, under pines, &c.

*Gyromitra esculenta*, though frequently eaten, is not always safe, a circumstance which may depend rather on peculiarity of constitution than on any intrinsically deleterious property. (Berk.)

MITRULA. Fries (emended). (figs. 29, 30, p. 188).

Ascophore stipitate, fleshy; head subglobose, ovate, or clavate, even, glabrous, everywhere covered with the hymenium, adnate throughout to the more or less elongated stem; asci cylindric-clavate, 8-spored; spores narrowly elliptic-fusiform, hyaline, continuous or septate, irregularly 1-2-seriate; paraphyses present.

*Mitrula*. Fries, Syst. Myc., i. p. 491. Sacc., Syll., viii. p. 32; Phil., Brit. Disc., p. 26.

*Leptoglossum*, Cooke, Mycogr., p. 250; Phil., Brit. Disc., p. 31; Sacc., Syll., viii. p. 47 (all in part).

*Geoglossum* in the older sense included all the clavate species, some of which had coloured, others hyaline spores. Karsten revised the genus and limited *Geoglossum* to those species with coloured spores; this change was objected to by Cooke—Mycogr., p. 1—as being quite unnecessary; however, in the same book, p. 250, Cooke accepted the revision made by Karsten—Myc. Fenn., p. 7—and suggested the name of *Leptoglossum* for the residue of the ancient *Geoglossum* having hyaline spores. This breaking up of the old genus *Geoglossum* into two genera was not only justified by the colour of the spores, but also by their arrangement in the ascus. The coloured spores are in all cases very long, and arranged in a parallel fascicle in the ascus, whereas the hyaline spores are always comparatively short, and consequently arranged in a 1-2-seriate manner in the ascus.

Finally, Saccardo—Syll., viii. p. 32—defines *Mitrula* by

having continuous, hyaline spores, and absorbs into that genus all the species of *Leptoglossum* reputed to have continuous spores, leaving the residue, having septate spores, in *Leptoglossum*. As a matter of fact, the spores are not continuous at maturity in *Mitrula*, hence Saccardo's distinction between *Mitrula* and *Leptoglossum* falls to the ground, and the two form a very natural genus, *Mitrula* by priority; distinguished by the even, entirely adnate, globose, ovate, or clavate receptacle; spores narrowly elliptic-fusiform, hyaline, septate or continuous, 1-2-seriate.

Growing on the ground, among dead leaves, &c.

***Mitrula phalloides*.** Chev., Fl. Par., p. 114; Sacc., Syll., viii. n. 92. (figs. 29, 30, p. 188).

Ascophore<sup>2</sup> stipitate, fragile, becoming hollow, form variable, clavate, subglobose, or ovate, often compressed when large, obtuse, yellow or orange-yellow, very smooth, entirely adnate to the stem, but the lower margin sharp and distinct and usually with two small notches on opposite sides  $\frac{1}{2}$ -1 cm. high, and often almost as broad; stem 2-4 cm. long, 2-4 mm. thick, straight or wavy, smooth and with a silky sheen, white or tinged with pink or yellow, silky-fibrous and white inside like the ascophore, becoming hollow; hypothecium formed of interwoven, closely septate hyphae, these pass into strings of sausage-like hyphae, deeply constricted at the septa, 8-11  $\mu$  thick, loosely interwoven, and filling up the central portion at first; asci narrowly cylindrical, apex narrowed, base long and slender, 8-spored; spores obliquely 1-seriate, or imperfectly 2-seriate near the apex, hyaline, smooth, elliptic fusiform, continuous or sometimes 1-septate at maturity,  $12-15 \times 3.5-4 \mu$ ; paraphyses septate, about 2  $\mu$  thick, sometimes branched, very slightly thickened at the tip.

*Clavaria phalloides*, Bull., Champ., t. 465, f. 3 (1789).

*Mitrula paludosa*, Fries, Syst. Myc., i. p. 491 (1821); Cooke, Mycogr., fig. 175; Greville, Scot. Cr. Fl., pl. 312 (excellent); Phil., Brit. Disc., p. 28, pl. ii. fig. 6.

On decaying leaves in damp places, among *Sphagnum*, &c.

Usually gregarious or even clustered, soft, quite glabrous everywhere. When large, the head is very frequently compressed, closely adnate with the stem, but its lower

termination distinctly defined; there are generally two notches in the margin of the adnate hymenium at its base, indicating the two flaps of which it is formed, as in *Spathularia*, to which the present species is closely allied.

*Var. alba.* Mass.

Entirely white, head subglobose; in other respects resembling the typical form.

*Mitrula alba*, W. G. Smith, Grev., vol. i. p. 136, t. 10, lower fig.; Cooke, Mycogr., fig. 177; Phil., Brit. Disc., p. 29.

Among submerged leaves.

Authentic specimen from W. G. Smith examined.

*Mitrula cucullata.* Fries, Summa Veg. Scand., p. 347; Phil., Brit. Disc., p. 27; Cooke, Mycogr., fig. 176; Sacc., Syll., viii. n. 100.

Gregarious, stipitate, head variable in shape, ovate, conical, or subglobose,  $3-4 \times 2$  mm., even, pale cinnamon or brownish, hollow; stem very slender, unusually flexuous, brown, rarely pale, glabrous, sometimes minutely downy below, cylindrical, 1.5–2.5 cm. long; asci cylindric-clavate, apex narrowed, 8-spored; spores hyaline, continuous, smooth, narrowly elliptical, ends acute, straight or slightly curved,  $10-12 \times 3 \mu$ , irregularly 2-seriate; paraphyses slender, apex slightly thickened.

*Elvella cucullata*, Batsch, Elench., fig. 152.

On decaying pine leaves.

Specimen in Phil., Elv. Brit., n. 53, examined.

*Mitrula viride.* Karst., Myc. Fenn., i. p. 29; Sacc., Syll., n. 124.

Fasciculate, entirely dingy viridigris-green, head cylindric-clavate, obtuse, terminating abruptly and irregularly below, sharply differentiated from the stem, hollow, often compressed, glabrous, rather slimy when wet, about 2 cm. long,  $\frac{1}{2}-\frac{3}{4}$  cm. thick; stem about the same length as the head, thinner, cylindrical, minutely squamulose, sometimes paler in colour, flesh greenish; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores hyaline, smooth, continuous, elliptic, 2-seriate,  $15-17 \times 5 \mu$ ; paraphyses slender, hyaline, very slightly clavate.

*Geoglossum viride*, Pers., Comm., p. 40.

*Leptoglossum viride*, Cke., Myc., fig. 14; Phil., Brit., Disc., p. 32, pl. ii. fig. 8.

On the ground in woods, among moss, decaying leaves, &c. Specimen in Cke., Fung. Brit., ed. ii., n. 395, examined.

Size variable, Phillips says "1-3 inches high; about  $\frac{1}{4}$  of an inch the broadest part." Cooke says the spores measure  $30 \times 10 \mu$ , but there is probably some mistake. Readily known by the dingy olive or verdigris-green of every part.

**Mitrula olivacea.** Sacc., Syll., viii. n. 135.

Gregarious or caespitose, 3-5 cm. high, dry, glabrous; club about half the entire length, compressed or grooved, often twisted and irregular in form, up to  $\frac{3}{4}$  cm. thick, smoky olive, brownish, or with a purplish tinge; stem sub-cylindrical, usually paler than the club, base slightly thickened and whitish; asci clavate, apex narrowed, 8-spored; spores hyaline, continuous, usually 4-guttulate, narrowly elliptic-oblong, often slightly curved,  $15-20 \times 5-6 \mu$ , irregularly 2-seriate at the upper part of the ascus, 1-seriate below; paraphyses filiform, branched.

*Geoglossum olivaceum*, Pers., Obs. Myc., i. p. 40, t. 5, f. 7.

*Geoglossum olivaceum*,  $\beta$ . *purpureum*, Berk., Outl., t. 22, fig. 2.

*Leptoglossum olivaceum*, Cooke, Mycogr., fig. 13; Phil., Brit. Disc., p. 33.

On the ground among short grass.

Distinguished by the dark olive or purplish colour of the club, which becomes blackish-green when old. The stem is often yellowish-brown.

Specimen in Cooke, Brit. Fung., n. 650, examined.

**Mitrula microspora.** Mass.

*Leptoglossum microsporum*. Sacc., Syll., viii. n. 157.

Ascophore 3-6 cm. high, black, the upper ascigerous portion slightly clavate, obtuse and distinct from the cylindrical stem, more or less viscid when moist; stem minutely squamulose under a lens, or smooth; asci cylindric-clavate, narrowed into a pedicel that is usually oblique at the base, spores 8, irregularly biseriate, hyaline, indistinctly 5-7 septate, cylindrical, ends obtuse, straight or slightly

curved,  $30-40 \times 5-6 \mu$ ; paraphyses very numerous, cylindrical, about  $2 \mu$  thick, not enlarged at the tip, brownish, agglutinated together.

*Leptoglossum microsporum*, Sacc., Syll., viii. n. 157.

*Geoglossum microsporum*, Cke. & Peck, 25th Report of New York Mus. Nat. Hist., p. 97; Phil., Brit. Disc., p. 39?; Cooke, Mycogr., p. 11?.

On the ground in scorched places under bracken (*Pteris*), &c.

The above account is drawn up from the American type specimen sent by Peck to Cooke, and on which the species was founded. In the original description in the 25th Report, the spore measurements given are ".0007'-.0013' long."

Some time afterwards Cooke again published the same species in "Mycographia," p. 8, fig. 11, as *Geoglossum microsporum*, C. & P., and in the description says, "sporidia  $.05 \times .01$  mm.," adding "Figured from specimens communicated by C. H. Peck." I have examined every specimen in the Kew Herbarium sent to Cooke by Peck from America, but find nothing agreeing with Cooke's measurements, which I imagine to represent an uncorrected mistake, as the figures of the spores given by Cooke do not justify the statement. Therefore I think it best to consider that no species of *Geoglossum* exists having spores  $50 \times 10 \mu$ . Phillips, in Brit. Disc., p. 39, has unfortunately given Cooke's incorrect diagnosis from "Mycographia," instead of the more approximately correct one from the 25th Report. It is evident that Phillips had not examined the specimen; finally, if Mr. C. Bucknall's specimen found at Hanham, Clifton, and which was presumably examined by Phillips, has spores  $10 \mu$  thick, it is not *G. microsporum*, but a new species which would naturally be called *Mitrula macrospora*.

*Var. tremellosum*, Cooke, Grev., iv. p. 109.

Somewhat tremellose when moist; ascigerous portion subcompressed, hollow, stem smooth, otherwise as in the type.

*Geoglossum tremellosum*, Cooke, Mycogr., p. 206, fig. 347; Phil., Brit. Disc., p. 39.

*Leptoglossum tremellosum*, Sacc., Syll., iv. n. 156.

On the ground.

This is referred to the American species as a variety, but it seems to be more tremellose than the typical form, and the sporidia do not flow out and cover the surface of the club; this may be accounted for in that the specimens were not so fully matured. Sporidia .03 mm. long. (Cooke in Grev., l.c.)

As the synonyms show, this variety was afterwards raised to specific rank by Cooke. After having examined the specimens I prefer the varietal position, if indeed it can be considered truly as such, and not as a mere form.

### SPATHULARIA. Pers. (figs. 22-24, p. 188.)

Receptacle erect, spathulate, compressed, hollow, adnate to the stem, down which it runs for some distance on opposite sides, everywhere covered with the hymenium; stem subcylindrical, hollow; asci clavate, apex narrowed, 8-spored; spores elongated, cylindric-clavate, multiseptate at maturity, arranged in a parallel fascicle in the ascus; paraphyses filiform, septate.

*Spathularia*, Persoon, Tentam. Disp., p. 36 (1797); Phil., Brit. Disc., p. 30; Sacc., Syll., p. 48.

Distinguished by the broad, flattened ascophore running down opposite sides of the stem.

Growing on pine leaves or on the ground among moss.

***Spathularia clavata*.** Sacc., Mich., ii. p. 77; Syll., viii. n. 160 (figs. 22-24, p. 188).

Head spathulate or broadly clavate, obtuse or sometimes more or less divided at the apex, hollow, much compressed, running down the stem for some distance on opposite sides, glabrous, margin crisped or undulated, surface wavy or slightly lacunose, yellow, rarely tinged red, 2-3 cm. high, 1.5-2.5 cm. broad; stem white then tinged yellow, 3-6 cm. long,  $\frac{1}{2}$ - $\frac{3}{4}$  cm. thick, hollow, cylindrical or slightly compressed; asci clavate, apex narrowed, 8-spored; spores arranged in a parallel fascicle, hyaline, linear-clavate, usually very slightly bent, multiguttulate then multiseptate, 50-60  $\times$  3.5-4  $\mu$ ; paraphyses filiform, septate, often branched, tips not thickened, wavy.



*Elvela clavata*, Schaeffer, t. 149 (1774).

*Spathularia flarida*, Pers., Comm. Fung. Clav., p. 34 (1797); Phil., Brit. Disc., p. 30, pl. ii. fig. 7; Cooke, Mycogr., fig. 342.

On the ground among pine leaves or moss.

Gregarious; variable in shape and size, but distinguished by the flattened ascophore adnate to and running for some distance down opposite sides of the stem. The hypothecium consists of branched, septate, interwoven, colourless hyphae of variable thickness, some are 6-8  $\mu$  thick, and when treated with dilute potassic hydrate and afterwards stained with anilin blue, show continuity of protoplasm very beautifully, the ends of adjoining cells being connected by a single, delicate, central strand as in many of the red seaweeds. Greville says the spores are discharged elastically.

Specimen examined in Berk., Brit. Fung., n. 257; Rehm, Ascom., n. 426; and Flora Exs. Austro.-Hung. n. 1974.

#### VIBRISSEA. Fries. (figs. 32-35, p. 188.)

Aquatic; ascophore sessile or stipitate, the disc becoming convex, somewhat fleshy; asci elongated, cylindric-clavate, apex more or less narrowed, attenuated downwards into a long, slender pedicel, 8-spored; spores needle-shaped, almost as long as the ascus, arranged in a parallel fascicle, hyaline, escaping from the ascus and remaining fixed to the surface of the disc for some time at maturity; paraphyses present.

*Vibrisea*, Fries, Syst. Myc., ii. p. 31; Phil., Brit. Disc., p. 316; Sacc., Syll., viii. p. 51 (in part).

The species grow on wood or dead branches, either completely submerged in water or in very damp places. At maturity the long, slender spores escape from the ascus and remain for a time attached by their basal end to the disc, giving it a minutely velvety and glistening appearance due to their rapid vibratory movements.

Saccardo has broken up the genus, as here understood, into two genera, placing the stipitate forms in *Vibrisea*, which is located next to *Spathularia*, while the sessile forms are included in *Gorgoniceps* and placed next to the genus *Belonidium* in the Pezizae.



*Vibrissea truncorum*. Fries, Syst. Myc., ii. p. 31; Phil., Brit. Disc., p. 316, pl. x. fig. 60; Sacc., Syll., viii. n. 167 (figs. 32-35, p. 188).

Ascophores gregarious or scattered, often in clusters of 2-4, stipitate, orbicular and rather fleshy, disc golden-yellow, orange, tawny, or blood-red, convex, 3-5 mm. across, hypothecium and excipulum hyaline, formed of intricately interwoven, septate hyphae about  $3\ \mu$  thick, passing into pseudo-parenchyma at the point where the widened apex of the stem joins the excipulum, and running out on the free surface into dark-coloured septate hyphae, which form more or less of a fringe round the margin of the disc; stem, 6-12 mm. long, 1.5-3 mm. thick, round, composed of more or less parallel, hyaline, septate hyphae, densely covered with dark-coloured, obtuse, septate hyphae pointing at right angles to the long axis of the stem; asci elongated, narrowly cylindrical, 8-spored; spores hyaline, very slender, nearly as long as the ascus,  $200-220 \times 1.5\ \mu$ , multiseptate, arranged in a parallel fascicle in the ascus; paraphyses very slender, septate, sometimes branched, tips slightly thickened and coloured.

*Leotia truncorum*, Alb. & Schw., Consp., p. 397, t. 3, fig. 2.

*Vibrissea Margarita*, White, Scot. Nat., vol. ii. p. 218; Phil., Brit. Disc., p. 318; Sacc., Syll., viii. n. 170.

On decaying wood and branches in streams; most abundant in subalpine districts.

The head is about 2 lines broad, at first plane, becoming convex, often slightly repand, umbilicate beneath; the stem, at first stuffed, becomes hollow, is 2-6 lines high, bluish-grey, with blackish squamules, or smooth, darker towards the base; the asci are very long, cylindrical, numerous; the spores very slenderly filiform, divided by numerous septa, narrower towards each extremity, 8 in the ascus; paraphyses numerous, branched; septate, enlarged and brownish at the summits. When removed from the water and exposed for a short time to the air, the spores shoot out from the hymenium with more or less violence, many of them remaining attached by one extremity to the hymenium, waving to and fro like floss silk, glittering in the light. (Phillips.)

The blackish squamules mentioned by Phillips as occurring on the stem, are due to the clustering together of a number of the radiating hairs clothing its surface.

Specimens examined in Phil., Elv. Brit., n. 4, and Moug. & Nest., n. 781. Specimens of *Vibrissea Margarita*, sent to Kew by the author, have also been carefully examined, and proved to be identical in every respect with *V. truncorum*.

**Vibrissea Guernisaci.** Crouan, Ann. Sci. Nat., 1857, t. iv. figs. 24-26; Phil., Brit. Disc., p. 319, pl. x. f. 61.

Ascophore sessile, at first subglobose and somewhat narrowed at the base, then expanding until the disc is slightly convex and more or less distinctly marginate, greyish or with a tinge of orange, rather fleshy, glabrous, flesh-coloured, subgelatinous, 2-3 mm. across; hypothecium parenchymatous, running out at the margin into parallel rows of septate, olive hyphae; asci long, narrowly cylindrical, 8-spored; spores needle-shaped, very slender, hyaline, apex rounded, base pointed, straight or slightly bent, multi-septate at maturity, almost as long as the ascus and arranged in a parallel fascicle,  $250-270 \times 1.5-2 \mu$ ; paraphyses slender, septate, often branched near the slightly clavate tips.

*Gorgoniceps Guernisaci*, Sacc., Syll., viii. n. 2082.

On submerged branches of willow and alder.

At maturity the disc is covered with the projecting spores, which glisten like the finest floss silk as they wave to and fro.

Specimen in Elv. Brit., n. 143, examined.

**Var. leptospora.** Mass.

Disc yellowish; paraphyses slender, septate, tips broadly pyriform or globose,  $6-7 \mu$  across, otherwise as in the type.

*Peziza leptospora*, B. & Br., Ann. Nat. Hist., n. 1166, t. iv. f. 30.

*Vibrissea leptospora*, Phil., Brit. Disc., p. 320.

*Gorgoniceps leptospora*, Sacc., Syll., viii. n. 2086.

On decayed wood.

*Patellaria Fergussoni*, B. & Br., Ann. Nat. Hist., n. 1490, t. 11, fig. 6.

*Vibrissea Fergussoni*, Phil., Brit. Disc., p. 318; Sacc., Syll., viii. n. 173.

On branches of *Prunus padus*.

Type specimens examined.

**Var. vibrisseoides.** Mass.

Disc yellowish, more or less distinctly bounded by the

delicate, raised margin; paraphyses septate, tips brown, clavate, about  $3.5\ \mu$  thick.

*Helotium vibrisseoides*, Peck, 32nd Report, 1879.

*Vibrissea turbinata*, Phil., Brit. Disc., p. 320.

On branches of ash in a watercourse.

British specimen named by Phillips, examined.

***Vibrissea microscopica*.** B. & Br., Ann. Nat. Hist., n. 1618, ser. iv. vol. xvii. p. 142 (1876); Phil., Trans. Linn. Soc., ser. xi., vol. ii. p. 7, t. i. f. 17-24; Phil., Brit. Disc., p. 319; Sacc., Syll., viii. n. 175.

Very minute, shortly stipitate, at first piriform, then expanding and becoming concave or almost plane, grey, about  $\frac{1}{4}$  mm. high and broad; excipulum pseudoparenchymatous, the cells running out into parallel, septate hyphae at the surface and margin; asci narrowly clavate, apex narrowed, pedicel long and slender, 8-spored; spores arranged in a parallel fascicle, hyaline, continuous, often slightly curved; needle-shaped,  $50-60 \times 2\ \mu$ ; paraphyses very slender, numerous, tips not thickened.

On damp fir-wood.

Type specimen examined.

Scarcely visible without a lens. Stem very short, black; head grey, leaving a cup-shaped depression when completely washed off; sporidia ejected, filiform. (B. & Br.)

GEOGLOSSUM. Pers. (emended). (figs. 8-10, p. 188.)

Entire fungus more or less clavate, erect, the apical, thickened portion everywhere covered with the hymenium; glabrous or hairy, often viscid; asci clavate, apex narrowed, 8-spored; spores elongated, arranged in a parallel fascicle, cylindrical or very slightly thickened above the middle, and inclined to become cylindric-clavate, brown, septate, usually slightly curved; paraphyses septate, brown at the tips, often longer than the asci.

*Geoglossum*, Persoon, Obs. Mycol., i. p. 11; Sacc., Syll., viii. p. 42; Phil., Brit. Disc., p. 34 (in part).

Distinguished among the clavate species by the long, nar-

row, brown, septate spores. The entire plant is black in all British species.

Growing on the ground, among grass, &c.

\* *Ascophore glabrous.*

† *Spores 3-septate.*

**Geoglossum glutinosum.** Pers., Obs., i. p. 11 ; Phil., Brit. Disc., p. 38 ; Sacc., Syll., n. 136 ; Cke., Mycogr., fig. 6. (figs. 8-10, p. 188.)

Ascophore 3-6 cm. high, black, glabrous ; ascigerous portion about  $\frac{1}{3}$  of the entire length, oblong-lanceolate, up to 1 cm. broad, obtuse, slightly viscid, more or less compressed, passing imperceptibly into the somewhat slender, cylindrical, viscid, brownish-black stem ; asci clavate, tapering downwards into a long, slender pedicel ; spores 8, arranged more or less parallel near the apex of the ascus, cylindrical, ends obtuse, 3-septate and clear brown at maturity, straight or very slightly curved,  $65-75 \times 5-6 \mu$  ; paraphyses numerous, distinctly septate, about  $2 \mu$  thick, pale brown, apex broadly pyriform and filled with dark brown colouring-matter.

On the ground among grass, &c.

The most important features of the present species are, 3-septate brown spores and compressed ascophore.

**Geoglossum viscosum.** Pers., Comm., p. 39 ; Phil., Brit. Disc., p. 37 ; Cke., Mycogr., p. 10 ; Grev., Scot. Cr. Fl., pl. 55 ; Sacc., Syll. n. 137.

Ascophore 3-5 cm. high, glabrous, black, viscid ; ascigerous portion about  $\frac{1}{4}$  of the whole, broadly fusiform, obtuse, not compressed, passing imperceptibly into the glabrous, cylindrical slimy stem, which is usually brownish at the base ; asci clavate, attenuated into a long, slender base ; spores 8, grouped parallel in a fascicle near the apex of the ascus, cylindrical, ends obtuse, 3-septate and brown at maturity, straight or slightly curved,  $70-90 \times 5-6 \mu$  ; paraphyses numerous, distinctly septate, cylindrical and about  $2 \mu$  thick, pale brown, the apex usually abruptly swollen into a globose, dark-brown head, 6-8  $\mu$  diameter.

Among grass in pastures, &c.

Somewhat gregarious; sometimes with an olivaceous tinge. Very closely allied to *G. glutinosum*, of which I am inclined to consider it a variety; distinguished by being more viscid, ascophore not becoming compressed, and large, globose heads of the paraphyses. This last character is, however, very variable, and examination of a very large series of specimens of *G. glutinosum* and *G. viscosum* shows a perfect sequence from abruptly globose to narrowly pyriform tips of paraphyses. I find—contrary to descriptions—the paraphyses constantly septate in both species.

Subgregarious, carnosu-coriaceous, 1–2 inches in height, black, paler with a brown tinge at the base of the stipes, which is slender, cylindrical, slimy, especially in moist weather. Hymenium black, confluent with the stem, sometimes of the same diameter, at others sometimes thicker, and of an oblong form; obtuse at the apex, rounded, not compressed. This species is chiefly distinguished by its cylindrical or rounded hymenium; that of *G. glutinosum* (to which species it is most nearly allied) being compressed. (Greville.)

† *Spores 7-septate.*

**Geoglossum glabrum.** Pers., Obs. Myc., ii. p. 61 Phil., Brit. Disc., p. 36; Cooke, Mycogr., fig. 1.

Ascophores gregarious, 3–7 cm. high, everywhere blackish, dry; ascigerous portion, or club, about half the entire length, cylindric-clavate, glabrous; stem rather slender, often crooked, minutely squamulose; asci clavate, apex slightly narrowed, pedicel elongated, slender, 8-spored; spores arranged in a parallel fascicle in the ascus, narrowly cylindric-clavate, the upper half slightly thickest, often slightly curved, 7-septate at maturity, often very slightly constricted at the septa, each cell generally 1-guttulate, brown,  $70\text{--}75 \times 7 \mu$ ; paraphyses septate, upper septa rather close and more or less constricted, apex clavate,  $7\text{--}9 \mu$  thick, brown; straight or curved.

*Geoglossum ophioglossoides*, Sacc., Syll., viii. n. 141.

On the ground among grass.

Specimens in Rehm, Ascom., n. 503, and Phil., Elv. Brit.,

n. 11, examined, also a specimen in Herb. Kew. named by Persoon.

*Geoglossum difforme*. Fidei. Mss. l. p. 146; Phil. Brit. Disp., p. 46; Cooke, Mycogr., fig. 7, Sect. Syll., viii. n. 143.

Entire length 4-6 cm., slightly viscid when moist, black, glabrous, club about half the entire length, often irregularly bent and compressed, dense, distance from the stem, up to 1 cm. thick; stem thinner than the club, more or less cylindrical and even; asci clavate, apex narrowed, 8-spored; spores arranged in a parallel fascicle in the ascus, slightly curved when free, cylindrical-lanceol., apex very slightly thickened, 7-septate, brown, 30-100  $\times$  5  $\mu$ ; paraphyses septate, slender, scarcely or not at all thickened at the pale brown, sterile tips, longer than the asci.

On the ground among grass.

Closely allied to *G. glabrum*, differing mainly in the paraphyses, which are pale brown and not clavate at the tips.

Specimens examined in Berk., Brit. Fung. n. 256; Cooke, Brit. Fung. n. 481, and Rabenh., Herb. Myc., ed. II. n. 414.

### \*\* *Asciophore and stem hairy.*

*Geoglossum hirsutum*. Pers., Charac. p. 37; Cooke, Mycogr., fig. 8; Phil., Brit. Disp., p. 44; Sacc., Syll., viii. n. 159.

Asciophore 5-7 cm. high, entirely black; asciogenous portion about half the whole length, oblong or ovate, generally more or less compressed and longitudinally wrinkled, up to 1 cm. at widest part, minutely hairy, as is also the cylindrical stem; asci clavate, apex slightly narrowed, pedicel slender, 8-spored; spores arranged in a parallel series in the ascus, the mass of spores narrowed at base and apex, brown and often with an olive tinge, linear-fusiform, slightly thicker at the apical half, just a little curved, multisepate, 100-150  $\times$  5  $\mu$ ; paraphyses numerous, separate, slightly thickened at the apex, which is brownish, and often more or less curved; mixed with the



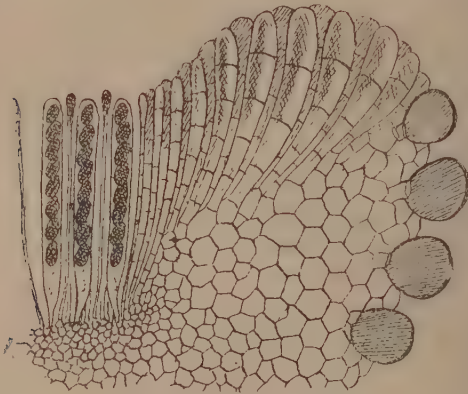
perianths are numerous blackish-brown sharp-pointed spines (serrules), which are 4-7  $\mu$  which project beyond the anther and cause the hairy appearance of the hymenium.

Caespitose or gregarious on the ground among grass.

Readily distinguished by the hairy hymenium and stem. The hairs on the stem gradually become smaller as they recede from the arborescent portion, and are probably the last remains of a condition when the whole above-ground portion was fertile, and no differentiated stem existed.

## ADDENDA.

**Schweinitzia rufo-olivacea.** Mass., p. 125 of present volume, from which place this figure was inadvertently omitted.



*Schweinitzia rufo-olivacea.* Section of a portion of the ascophore.

**Scleroderris livida.** Mass., Fung.-Flora, p. 127.

Very fine specimens collected by Mr. C. Crossland near Halifax enable the following points to be added : Erumpent ; disc convex or plane, soft, fleshy, pale opaque dingy orange-buff, pruinose and glistening ; hypothecium yellow ; spores 7-septate at maturity, but mostly 3-septate. Apical plug of ascus brown, not blue, with iodine.

On pine bark.

**Orbilbia succinea.** Quélet, Enchirid. Fung., p. 298 ; Sacc., Syll., viii. n. 2576 ; Rehm, Krypt.-Flora, Disc., p. 460.

Gregarious, minute, subgelatinous when moist, at first globose, becoming expanded and slightly concave, glabrous, amber-colour, then darker, up to  $\frac{1}{2}$  mm. across; stem very short, slender; asci cylindric-clavate, apex narrowed, 8-spored; spores hyaline, continuous, cylindric-fusiform, straight,  $5 \times 1 \mu$ , irregularly 2-seriate; paraphyses very slender.

*Calloria succinea*, Fr., Summ. Veg. Scand., p. 359.

*Calloria electrina*, Phil. & Plow., Grev., x. p. 68.

*Peziza electrina*, Phil. & Plow. Grev., viii., p. 153.

*Hymenoscypha electrina*, Phil., Brit. Disc., p. 142.

Conidial stage. Receptacle exactly resembling the ascophore, into which condition it gradually passes after producing conidia. The disc is covered with delicate, hyaline, branched conidiophores, bearing at their tips, hyaline, continuous, cylindrical conidia, ends obtuse, straight or curved,  $14 \times 2 \mu$ .

*Dacryomyces succineus*, Fr., Hym. Eur., p. 699; Mass., Fungus-Flora, vol. i. p. 67.

*Calloria succinea*, Fr., Summa Veg. Scand., p. 359.

On pine leaves.

Authentic specimen from Phillips examined.

(Should stand next to *O. leucostigma*, p. 147.)

### **Mollisia fusca.** Mass.

Gregarious or sometimes crowded, sessile, at first depressoglobose and closed, then hemispherical or almost plane, but the margin is permanently raised, up to 1 mm. across; disc grey or brownish, externally brown, the margin minutely fimbriate; cortex parenchymatous, cells irregularly polygonal, olive,  $5-7 \mu$  diameter, running out into short, thin-walled, cylindrical or subclavate, obtuse, 1-3-septate hairs, olive at the base, upper portion white,  $30-40 \times 3-4 \mu$ ; hypothecium olive; asci cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, hyaline, continuous, straight or slightly curved, narrowly elliptic-fusiform,  $7-11 \times 2-2.5 \mu$ ; paraphyses slender, hyaline, cylindrical.

*Lachnella Schumacheri*, Phil., Brit. Disc., p. 262.

*Trichopeziza fusca*, Sacc., Syll., viii. n. 1710.

On dead wood.

A somewhat anomalous species; the marginal hairs are somewhat lax and irregular in length for a typical *Mollisia*; on the other hand, the hairs are not sufficiently developed for a *Dasycephala*, neither do we find the hypothecium coloured in the last-named genus.

Specimen in Phil., Elv. Brit., n. 167, examined.

(To follow *M. lignicola*, p. 206.)

### ***Mollisia carduorum*. Mass.**

Gregarious or sometimes confluent, sessile, at first globose and closed, finally becoming almost plane, with a slightly raised margin, contracted and incurved when dry; disc dingy yellow or dark grey; externally blackish-olive or brown, with a few spreading hyphae at the base,  $\frac{1}{2}$ – $1\frac{1}{2}$  mm. across; cortex parenchymatous, cells irregularly polygonal, 5–6  $\mu$  diameter, greyish-olive, running out at the margin into paler, parallel, septate hyphae; asci narrowly clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, elongated, narrowly fusiform or clavate, 2–4-guttulate then 1-septate, hyaline, usually very slightly bent,  $15\text{--}21 \times 2\text{--}3 \mu$ ; paraphyses slender, septate, very slightly clavate.

*Niptera carduorum*, Winter, Flora, 1872, p. 7 (in the reprint); Rehm, Krypt.-Flora, Disc., p. 555.

*Pyrenopeziza carduorum*, Sacc., Syll., viii. n. 1483.

On dead stems of thistle (*Cnicus arvensis*); also on *Lappa*, according to Rehm.

West Kilbride, Ayrshire (D. A. Boyd).

Specimen in Rehm's Ascom., n. 68, examined.

Very closely allied to *Belonidium Arctii*, of which it may prove to be a variety with smaller spores. The presence of four guttulae suggest that the spores may become 3-septate at maturity.

(To follow *Mollisia digitalina*, p. 211.)

### ***Mollisia mutabilis*. Mass.**

Scattered, appearing as minute, dark-brown, downy points, at first globose and closed, then expanded until quite plane, about  $\frac{1}{2}$  mm. across; disc whitish, externally brown; glabrous; cortex parenchymatous, cells subcircular or hexagonal, brownish, 7–10  $\mu$  diameter, running out into narrow, elongated cells at the very blunt margin; asci narrowly clavate, apex narrowed, 8-spored; spores hyaline, irregularly 2-seriate,

narrowly cylindric fusiform, sometimes 2-guttulate, 14-17  $\times$  2.5-3  $\mu$ ; paraphyses very slender, hyaline, cylindrical.

*Peziza mutabilis*, B. & Br., Ann. Nat. Hist., n. 564.

*Tapesia mutabilis*, Phil., Brit. Disc., p. 278; Sacc., Syll., viii. n. 1553.

On dead leaves of *Aira caespitosa*.

A true *Mollisia*; when young and incurved, brown, when fully expanded entirely white or pallid. Berkeley says: "When old it bears some resemblance to pale forms of *P. atrata* and *P. palustris*. The minute speck of down at the base is completely covered when the plant is fully expanded, and cannot be considered as a tapesium or subiculum."

Type specimen examined.

(To follow *M. juncina*, p. 214.)

***Mollisia dactylogluma*.** Cooke, Grev., vol. xix. p. 86; Sacc., Syll., Suppl., x. n. 4527.

Scattered or gregarious, sessile, globose and closed at first, then expanding until plane, glabrous, rather fleshy; disc pallid or with a grey tinge, externally pale greyish-olive, paler towards the margin,  $\frac{1}{4}$ - $\frac{1}{3}$  mm. across; cortex parenchymatous, cells irregularly subcircular, 7-10  $\mu$  diameter, becoming slightly smaller upwards, and running out at the margin into parallel, obtuse, 1-2-septate hyphae; asci narrowly cylindric-clavate, apex slightly narrowed, 8-spored; spores irregularly 2-seriate, hyaline, smooth, straight or very slightly curved, continuous, narrowly cylindrical, or often with a clavate tendency, 7-10  $\times$  1.5  $\mu$ ; paraphyses hyaline, slender, very slightly thickened upwards.

On glumes of *Dactylis glomerata*.

Type specimen, now in Herb. Kew, examined.

(To follow *M. stramineum*, p. 215.)

***Belonidium deparculum*.** Mass.

Gregarious, sessile, minute, rarely more than  $\frac{1}{4}$ - $\frac{1}{3}$  mm. across; subglobose and closed at first, then becoming nearly plane, thin, disc pallid or with a tinge of yellow, outside pallid and minutely pulverulent; when dry hemispherical, concave, ochraceous or pale reddish-yellow; asci short, cylindric-clavate, apex rounded, 8-spored; spores irregularly 2-seriate, hyaline, narrowly cylindrical, straight or slightly

bent, at first continuous, then 1- finally 3-septate, 12-16  $\times$  1.5  $\mu$ ; paraphyses slender, hyaline, tips thickened.

*Helotium deparculum*, Karsten, Myc. Fenn., i. p. 150; Phil., in Grev., xx. p. 38.

*Pseudohelotium deparculum*, Sacc., Syll., viii. n. 1224.

On dead stems of meadow-sweet.

Specimens in Kunze, Fung. Sel., n. 387, examined.

(To follow *B. ventosum*, p. 224.)

### **Pocillum Needhami.** Mass. & Crossl.

Hypophyllous, scattered, subcylindrical or turbinate, narrowed to a very short, stem-like base, disc circular, plane, truncate, substance soft and watery, whitish with a slight tinge of flesh-colour, tinged with amber when dry, about  $\frac{1}{2}$ - $\frac{2}{3}$  mm. broad and high; cortex formed of more or less parallel rows of septate hyphae extending from base to margin, where they are brownish, 4  $\mu$  thick, sometimes branching; asci clavate, apex narrowed, often slightly curved, 8-spored; spores irregularly 2-seriate, hyaline, smooth, continuous, often guttulate, narrowly elliptical, or sometimes with a very slight tendency to become clavate, 18-20  $\times$  3-4  $\mu$ ; paraphyses cylindrical, slender, hyaline.

On fallen decaying leaves, probably belonging to *Salix caprea*.

The spores often contain 3-4 guttae, and may possibly be septate when quite mature. This very interesting addition to our Mycologic Flora was found near Hebden Bridge, Yorkshire, by Mr. Needham, an enthusiastic collector of fungi.

(To follow *P. Boltoni*, p. 231.)

### **Helotium nudum.** Mass.

Gregarious, plane or convex, stipitate, waxy, flesh-colour, glabrous; disc same colour, undulated; stem long, flexuous, expanding into the ascophore; asci cylindraceo-clavate; spores 8, fusiform or oblong-elliptic, hyaline, 5-10  $\times$  2-3  $\mu$ ; paraphyses acerose, granular within, exceeding the asci.

*Peziza nuda*, Phil., Scot. Nat., vi. p. 124.

*Lachnella nuda*, Phil., Brit. Disc., p. 247.

On the ground amongst moss, in a fir wood.

Ascophore 1 line broad, and 2 lines high.



A large and *Helotium*-like species, having acerose paraphyses, which have never been observed before in a perfectly glabrous species, the presence of which fully justifies placing here. The asci are  $500\ \mu$  long, and  $4\ \mu$  broad; the paraphyses are  $70\ \mu$  long. (Phil.)

There appears to be some mistake in the measurements of the asci and paraphyses as given above, as the paraphyses are described as being longer than the asci; probably the asci are  $50\ \mu$  instead of  $500$  as stated.

Unknown to me.

(To follow *H. lacteum*, p. 269.)

**Sclerotinia baccarum.** Rehm, Hedw., 1885, n. i. p. 9; Sacc., Syll., viii. n. 813; Rehm, Krypt.-Flora., Disc. p. 806; Woronin, Mém. Acad. Imp. St.-Petersb., p. 31, pl. viii. (1888).

Sclerotium formed within the fruit of *Vaccinium myrtillus*, and producing 1-3 stipitate ascophores which are closed when young, then hemispherical, finally expanded, brown, glabrous, rather thin,  $\frac{1}{2}$ -1 cm. across, stem variable in length, 2-4 cm. long, cylindrical, slender, often flexuous, brown, glabrous, or minutely velvety at the base; hypothecium brown, formed of interwoven hyphae; asci cylindrical, apex slightly truncate, narrowed below into a slender, usually crooked pedicel, 8-spored; spores 1-seriate, hyaline, continuous, smooth, elliptical, ends rounded,  $16-20 \times 8-9\ \mu$ ; as a rule only four of the spores in an ascus become fully developed, the other four remaining quite small; paraphyses slender, septate, hyaline, apex slightly clavate.

The conidial form attacks the young, living shoots of the host-plant, appearing as a *Monilia*-like, white bloom formed of simple or branched chains of subglobose, hyaline conidia about  $3\ \mu$  diameter.

The ascophores appear on the fallen fruit of *Vaccinium myrtillus*, which contain sclerotia in their interior. Infected fruits are readily recognised before they fall from the plant by their whitish colour and somewhat shrivelled appearance.

Dr. Trail, F.R.S., of Aberdeen, has collected berries containing sclerotia, but mature ascophores are not yet recorded.

(To follow *S. bulborum*, p. 284.)

**Mollisia melaleuca.** Sacc., Syll., n. 1394.

Gregarious, sessile, at first closed then becoming plane, often irregular, rather firm, contracted when dry, disc whitish, pallid when dry, externally blackish-brown, minutely rugulose or granular; cortex parenchymatous, cells 7-8  $\mu$  diameter, brown, running out into parallel septate hairs at the entire margin, 1-2 mm. across; asci narrowly clavate, slightly narrowed at the apex, spores 8, 2-seriate, hyaline, continuous, often 2-guttulate, straight or slightly bent, 9-14  $\times$  2-2.5; paraphyses hyaline, slender.

*Peziza melaleuca*, Fr., S. M., ii. p. 150.

Exsicc.—Cke., Fung. Brit., n. 390; Phil., Elv. Brit., n. 125; in both instances called *Peziza cinerea*, Batsch, with which it has been confounded, but is quite distinct in the dryer texture, white disc, and blackish-brown exterior.

On hard, decorticated wood, chips, &c.

**Mollisia cinerea.** Karst., Myc. Fenn., i. p. 189; Sacc., Syll., viii. n. 1393; Phil., Brit. Disc., p. 173 (in part).

Gregarious, at first closed then plane, rather fleshy and watery, disc greyish; margin whitish and often irregular, dingy yellow or often blackish when dry and remaining flat; externally smooth, brownish, especially near the base, where it is furnished with brown hyphae; 1-2 mm. diameter; cortex parenchymatous, cells olive-brown, 8-12  $\mu$  diameter, passing into parallel, slightly clavate, septate hairs at the margin; asci narrowly clavate, tip very slightly narrowed; spores 8, 2-seriate, narrowly elliptic-oblong, ends obtuse, hyaline, straight or very slightly curved, 7-10  $\times$  2-3  $\mu$ ; paraphyses slender, slightly thickened upwards.

*Peziza cinerea*, Batsch, Elench. Fung., p. 198, fig. 137.

Exsicc.—Cke., Fung. Brit., ed. ii. n. 383.

On dead wood and branches.

Distinguished by the watery, semipellucid substance and clear grey colour when fresh.

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